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ABSTRACT

The ACT Assessment is a measure of skills in English, mathematics, reading, and science reasoning necessary for college coursework. This booklet is intended to help students do their best on the ACT. It summarizes general test-taking strategies, describes the content of each of the tests, provides specific tips for each, and lets students know what they can expect on test day. The following sections are included: (1) "General Preparation for the ACT"; (2) "Strategies for Taking the ACT Tests"; (3) "What To Expect on the Test Day"; (4) "Taking the Practice Test" (with answer document and practice test); (5) "Scoring Your Practice Test"; and (6) "To Register for the ACT." The English test is a 75-question, 45-minute test that measures understanding of the conventions of standard written English and rhetorical skills. Calculator use is now allowed on the Mathematics test, which is a 60-question test that assesses mathematical skills typically acquired up to the beginning of grade 12. The Reading test is a 40-question test of reading comprehension, and the science reasoning test is a 40-question test that measures the interpretation, analysis, evaluation, reasoning, and problem-solving skills required in the natural sciences. (SLD)

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ACT Assessment

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Preparing

FOR THE ACT ASSESSMENT

ACT IC 3092.6

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Preparing for the ACT Assessment

New in Fall 1996!

The use of calculators is now permitted on the Mathematics Test. See page 4 for details.

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ACT endorses the *Code of Fair Testing Practices in Education*, a statement of guidelines for those who develop, administer, and use educational tests and data. The *Code* sets forth criteria for fairness in four areas: developing and selecting appropriate tests, interpreting test scores, striving for fairness, and informing test takers. ACT is committed to ensuring that each of its testing programs upholds the *Code*'s standards for appropriate test development practice and use.

A copy of the full *Code* may be obtained free of charge from ACT Publications, P.O. Box 168, Iowa City, IA 52243-0168, 319/337-1429.

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A Message to Students

The best indication of how well you will do in college is a measure of how well you can perform the skills necessary for college coursework. The ACT Assessment—you and your classmates probably call it simply "the ACT"—measures these skills in English, mathematics, reading, and science reasoning. These areas are tested because they include the major areas of instruction in most high school and college programs.

ACT is committed to representing the diversity of our society in all its aspects, including race, ethnicity, and gender. Thus, test passages and questions used in the ACT Assessment are deliberately chosen to reflect the range of cultures in our population.

ACT is also committed to ensuring that test questions are fair—that they do not disadvantage any particular group of examinees. Extensive reviews of the fairness of test materials are rigorously conducted by both ACT staff and external consultants. ACT also employs statistical procedures to help ensure that its test materials do not unfairly affect the performance of any group.

This booklet, which is provided free of charge, is intended to help you do your best on the ACT. It summarizes general test-taking strategies, describes the content of each of the tests, provides specific tips for each, and lets you know what you can expect on the test day. Most procedures refer to testing on a national test date. Procedures may differ slightly if you test outside the United States or through another type of testing. For example, if you test at a national test center, you won't need scratch paper because each page of the Mathematics Test will provide a blank column that you can use for scratch work. Otherwise, you will be provided with scratch paper. Included in this booklet are a practice test—"retired" ACT Assessment questions that were administered to students on a national test date—and a sample answer document and scoring instructions.

Read this booklet carefully and take the practice test well before the test day so you will be familiar with the ACT, what it measures, and the strategies you can use to do your best on it.

NOTE: Beginning in Fall 1996, the use of calculators is permitted on the Mathematics Test.

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1
General Preparation for the ACT

Choosing a Test Date

Before you choose a test date, consider the application deadlines of the colleges and scholarship agencies that are of interest to you. It will take four to seven weeks after a test date for ACT to mail your score report to you and to your college or agency choices.

Many college and scholarship agencies recommend that students take the ACT during the spring semester of their junior year. By this time, students typically have completed most of the coursework covered by the ACT. There are a number of advantages in taking the ACT during the spring of your junior year:

- You will receive test scores and other information that will help you plan your senior year in high school.
- Many colleges begin contacting prospective students during the summer before the senior year.
- If you do not score as well as you believe you can, there will be opportunities to retake the ACT in the early summer or fall of your senior year and still have the new information available in time to meet admission and scholarship deadlines.

NOTE: You cannot plan on receiving your scores from one test date in time to register for the next.

General Test-Taking Strategies

The ACT consists of tests in four areas: English, Mathematics, Reading, and Science Reasoning. Each of these tests contains multiple-choice questions that offer either four or five answer choices from which you are to choose the correct, or best, answer. The following suggestions apply to tests in all four areas:

Pace yourself.

The time limits set for each ACT test give nearly everyone enough time to finish all the questions. However, because the English, Reading, and Science Reasoning Tests contain a considerable amount of text, it is important to pace yourself so you will not spend too much time on one passage. Similarly, try not to spend too much time puzzling over an answer to a specific problem in the Mathematics Test. Go on to the other questions and come back if there is time.

Your supervisor will announce when there are five minutes remaining on each test.

Read the directions for each test carefully.

Before you begin taking one of the ACT tests, read the directions carefully. The English, Reading, and Science Reasoning Tests ask for the "best" answer. Do not respond as soon as you identify a correct answer. Read and consider all of the answer choices and choose the answer that *best* responds to the question.

The Mathematics Test asks for the "correct" answer. Read each question carefully to make sure you understand the type of answer required. Then, you may want to work out the answer you feel is correct and look for it among the choices given. If your answer is not among the choices provided, reread the question and consider all of the answer choices.

Read each question carefully.

It is important that you understand what each question asks. Some questions will require you to go through several steps to find the correct or best answer, while others can be answered more quickly.

Answer the easy questions first.

The best strategy for taking the ACT is to answer the easy questions and skip the questions you find difficult. After answering all of the easy questions, go back and answer the more difficult questions.

Use logic in more difficult questions.

When you return to the more difficult questions, try to use logic to eliminate incorrect answers to a question. Compare the answer choices to each other and note how they differ. Such differences may provide clues as to what the question requires. Eliminate as many incorrect answers as you can, then make an educated guess from the remaining answers.

Answer every question.

Your score on the ACT tests will be based on the number of questions that you answer correctly; **there is no penalty for guessing.** Thus, you should answer every question within the time allowed for each test, even if you have to guess. The supervisor will announce when there are five minutes remaining on each test.

Review your work.

If there is time left after you have answered every question in a test, go back and check your work in that test. Check to be sure that you marked only one answer to each question. You will not be allowed to go back to any other test or mark answers to a test after time has been called on that test.

Be precise in marking your answer document.

Be sure that you fill in the correct ovals and rectangles on your answer document. Check to be sure that the number of the line of ovals on your answer document is the same as the number of the question you are answering. Position your answer document next to your test booklet so you can mark your answers quickly and completely.

Erase completely.

If you want to change an answer on your answer document, be sure to erase the unintended mark completely.

Preparing for the Test Day

Although what you know will determine how well you do on the ACT, your attitudes, emotions, and physical state may also influence your performance. The following tips will help you do your best:

- Be confident in your ability to do well on the ACT. You can do well!
- Be prepared to work hard.
- Know what to expect on the test day. Familiarize yourself with the information in this booklet and in the registration booklet. Take the practice test and review your responses so you will feel comfortable about the approaching test day.
- Prepare well in advance for the test. Do not leave preparation to the last minute.
- Get plenty of rest the night before the test so you will be in good physical condition for taking it.
- Bring the following items with you to the test center:

  1. Your test center admission ticket (if you are testing on a national test date). If you registered late or made a test center change, your admission ticket will be a Western Union priority letter or mailgram.
  2. Acceptable identification. Your admission ticket is **not** identification. See details on page 5. If you do not present acceptable identification at the time of check-in, you will not be admitted to test.
  3. Three sharpened soft-lead (No. 2) pencils with erasers. Do **not** bring highlight pens or any other writing instruments; you will not be allowed to use them.
  4. A wristwatch so that you can pace yourself during the test. Do **not** bring a watch that has an alarm function. You will not be allowed to set an alarm because it will disturb other students. An announcement will be made by the supervisor when five minutes remain on each test.
  5. A calculator for use on the Mathematics Test, if you wish to use one. (See shaded section at right.)

For students testing on national test dates:

- Check your admission ticket for the location of the test center to which you have been assigned. If you are unfamiliar with the location, do a practice run to see how to get there and how much time you will need to arrive by 8:00 A.M.
- Plan to arrive promptly at 8:00 A.M. for the test session. If you arrive earlier than 7:45 A.M., you will probably have to wait outside until the testing personnel have completed their arrangements.
- Be prepared for testing to start after all examinees present at 8:00 A.M. have been checked in and assigned seats.
- Dress comfortably. To conserve energy, your test center may be considerably warmer or cooler on weekends than during the week. Please dress in such a way that you will be comfortable in a variety of temperatures.

Use of Calculators on the Mathematics Test

ACT now allows the use of certain kinds of calculators on the Mathematics Test, but you are not required to use a calculator. All problems on the Mathematics Test can be solved without using a calculator.

- It is your decision whether or not to use a calculator on the Mathematics Test. If you regularly use a calculator in class or when doing your homework, it makes sense to use it on the Mathematics Test. On the other hand, if you aren't comfortable using a calculator, you may not wish to use one on the Mathematics Test.
- If you decide to bring a calculator, we encourage you to use the type of calculator that you are used to at school or at home—as long as it is not one of the kinds of calculators **not** permitted. It is unlikely that using a more powerful calculator that you are not familiar with will give you an advantage over the kind you normally use.
- For test security reasons, to avoid disturbances in the testing room, and to ensure fairness for all test takers, the following types of calculators are not permitted:

  pocket organizers
  handheld or laptop computers
  electronic writing pads or pen-input devices
  models with a QWERTY (typewriter) keypad
  models with paper tapes
  models that make noise
  models that can communicate (transfer data or information) wirelessly with other calculators
  models that require a power cord

- You may use any four-function, scientific, or graphing calculator on the Mathematics Test, as long as the calculator has none of the features included in the list above.
- If you plan to use a calculator on the Mathematics Test, you are responsible for bringing one to the test center. Sharing calculators during the Mathematics Test is **not** permitted, and the test center supervisor will **not** lend you a calculator.
- You are also responsible for making sure your calculator works properly. If your calculator uses batteries, make certain that the batteries are strong enough to last throughout the testing session. You may bring a spare calculator and extra batteries with you to the testing session in case one malfunctions or the batteries die. Test center personnel **do not** have extra batteries or calculators available.
- Calculators may be used **only** on the Mathematics Test.
- If you bring a calculator, the test supervisor will make sure that (1) you are using an acceptable type of calculator, (2) you use your backup calculator only if your primary calculator fails, (3) you do **not** share your calculator with any other test taker, (4) you do **not** use your calculator's memory to store any test materials, and (5) you use your calculator **only** on the Mathematics Test.
- If your calculator has large characters (one-inch high or larger) or a raised display, the test supervisor may assign you to a seat where no other test taker can see your calculator.

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Identification Required at Time of Check-In

Acceptable identification must be presented at the time of check-in or you will **not** be admitted to test. This requirement is designed to protect **you.** Present ONE of the following:

1. **Current Official Photo ID:** Current official photo ID recently issued by your school, employer, or city/state/federal government (for example, driver's license or current passport) on which BOTH your name and current photograph appear. Only photo ID issued by one of these listed institutions is acceptable.

2. **Recent Published Photo:** Recognizable *individual* photograph of you in a recent school yearbook or other publication (such as a newspaper) with your first and last names in the caption. If you bring a newspaper clipping, the testing staff may keep it to send to ACT.

3. **School Letter of Identification:** If you do not have acceptable photo ID, ask your counselor or other school official (who may **not** be a relative) for a letter of identification. Your counselor's letter must be **on school letterhead** and include your name and *full physical description* or a recognizable recent photograph with school seal or school official's signature across a portion of the photo. (If school letterhead is computer-generated, a school seal is **required.**) A photocopy of a transcript may be used **only** if it includes a recent photo and is signed as described below.

You must sign the letter **in ink in the presence of** the counselor or school official (who may **not** be a relative), and that official must also **personally** sign the letter in **ink.** Printed, stamped, or photocopied signatures are not acceptable. You will be required to sign the letter again on the test day in the presence of testing staff, and they will keep the letter to send to ACT.

4. **Notarized Statement with Photo:** If you do not have acceptable photo ID *and* you do not attend a high school, contact a notary public (who may **not** be a relative) for a statement of identification. Attach a current photograph of yourself to a sworn statement. You must sign this statement in the presence of the notary public, and the notary public must notarize the statement with the notary seal or stamp affixed to a portion of the photo. You will be asked to sign the statement again at the test center, and the testing staff will keep it to send to ACT.

If you do not present one of the forms of ID in the above list, you will **not** be admitted to the test center. The following forms of ID are **unacceptable:** photo ID issued by a business for promotional purposes (for example, amusement parks); membership card (for example, health clubs); birth certificate; Social Security card; credit card, with or without photo. Your parents or classmates may **not** present identification on your behalf or "vouch for" you.

Plan ahead and be certain you will have acceptable ID with you at check-in on the test day. (Traffic tickets or police reports documenting a stolen wallet, even though they may include a physical description and signature, are **not** acceptable.) If you have any questions about acceptable ID, call ACT Test Administration (319/337-1510) *before* the test day.

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Strategies for Taking the ACT Tests

The ACT measures the knowledge, understanding, and skills that you have acquired throughout your education. Although the sum total of this knowledge cannot easily be changed, your performance in a specific subject matter area can be affected by adequate preparation, especially if it has been some time since you have taken a course in that area.

There are three strategies that can help you to prepare yourself for the content included in the ACT:

Familiarize yourself with the content of the ACT tests.

Review the information about the tests that is provided on the following pages. Note which content areas make up a large proportion of the tests and which do not. The specific topics included in each content area are examples of possible topics; they do not include all of the possibilities.

Refresh your knowledge and skills in the content areas.

Review those content areas you have studied but do not have freshly in your mind. Spend your time refreshing your knowledge in the content areas that make up large portions of the tests.

Identify the content areas you have not studied.

If unfamiliar content areas make up major portions of the tests, consider taking coursework to help you gain knowledge in these areas before you take the ACT. Because the ACT measures knowledge acquired over a period of time, it is unlikely that a "cram" course covering material that is unfamiliar to you will help you improve your scores. Longer-term survey courses in the subject matter will be most helpful to you, because they aim to improve your knowledge in the area.

ACT English Test

The English Test is a 75-question, 45-minute test that measures your understanding of the conventions of standard written English (punctuation, grammar and usage, and sentence structure) and of rhetorical skills (strategy, organization, and style). Spelling, vocabulary, and rote recall of rules of grammar are not tested. The test consists of five prose passages, each of which is accompanied by a sequence of multiple-choice test questions. Different passage types are employed to provide a variety of rhetorical situations. Passages are chosen not only for their appropriateness in assessing writing skills but also to reflect students' interests and experiences. Most questions refer to underlined portions of the passage and offer several alternatives to the portion underlined. These questions include "NO CHANGE" to the passage as one of the possible responses. Some questions are identified by a number or numbers in a box. These questions ask about a section of the passage or about the passage as a whole. You must decide which choice is most appropriate in the context of the passage, or which choice best answers the question posed.

Three scores are reported for the ACT English Test: a total test score based on all 75 questions, a subscore in Usage/Mechanics based on 40 questions, and a subscore in Rhetorical Skills based on 35 questions.

Tips for Taking the ACT English Test

Pace yourself.

The ACT English Test contains 75 questions to be completed in 45 minutes. If you spend 1–1½ minutes skimming through each passage before responding to the questions, then you will have about 30 seconds to answer each question. If possible, spend less time on each question and use the remaining time allowed for this test to review your work and return to the questions on this test that were most difficult for you.

Be aware of the writing style used in the passages.

The five passages cover a variety of topics and are written in a variety of styles. It is important that you take into account the writing style used in each passage when you respond to the questions. In responding to a question, be sure to understand the context of the question. It is best to skim through the whole passage quickly or, at a minimum, read the sentences immediately before and after the one containing an underlined portion. Read more of the passage if the writer's view still is unclear.

Examine the underlined portions of the passage.

Before responding to a question with an underlined portion, carefully examine what is underlined in the text. Consider the elements of writing that are included in each underlined portion. Some questions will ask you to base your decision on some specific element of writing, such as the tone or emphasis the text should convey. The answer choices for each question will contain changes in one or more of these elements of writing.

Be aware of questions with no underlined portions.

You will be asked some questions about a section of the passage or about the passage as a whole, in light of a given rhetorical situation. Questions of this type are identified by a question number in a box located at the appropriate point in the passage. Questions asking global questions about the entire passage are placed at the end of the passage and introduced by a horizontal box enclosing the following instruction: "Questions ___ and ___ ask about the preceding passage as a whole."

Note the differences in the answer choices.

Many of the questions in the test will involve more than one aspect of writing. Examine each answer choice and how it differs from the others. Be careful not to select an answer that corrects one error but causes a different error.

Determine the best answer.

Two approaches can be taken to determine the best answer to a question with an underlined portion. In the first approach, you can reread the sentence or sentences, substituting each of the possible answer choices for the underlined portion to determine the best choice. Or, as a second approach, you can decide how the underlined portion might best be phrased in standard written English or in terms of the particular question posed. If you think the underlined portion is the best possible phrasing as is, you should select the "NO CHANGE" answer. If not, you should check to see whether your phrasing is one of the other answer choices. If you do not find your phrasing, you should choose the best of the answers presented. For questions cued by a number in a box, you must decide which choice is most appropriate in terms of the question posed or the stated rhetorical situation.

Reread the sentence, using your selected answer.

Once you have selected the answer you feel is best for questions with underlined portions, reread the corresponding sentence(s) of the passage, substituting your selected answer for the underlined portion of the text to make sure it is the best answer within the context of the passage.

Content Covered by the ACT English Test

Six elements of effective writing are included in the English Test: punctuation, grammar, sentence structure, strategy, organization, and style. The questions covering punctuation, grammar, and sentence structure make up the Usage/Mechanics subscore. The questions covering strategy, organization, and style make up the Rhetorical Skills subscore. A brief description and the approximate percentage of the test devoted to each element of effective writing are given below.

Usage/Mechanics

Punctuation (13%). Questions in this category test your knowledge of the conventions of internal and end-of-sentence punctuation, with emphasis on the relationship of punctuation to meaning (for example, avoiding ambiguity, indicating appositives).

Basic Grammar and Usage (16%). Questions in this category test your understanding of agreement between subject and verb, between pronoun and antecedent, and between modifiers and the word modified; verb formation; pronoun case; formation of comparative and superlative adjectives and adverbs; and idiomatic usage (for example, choosing appropriate function words).

Sentence Structure (24%). Questions in this category test your understanding of relationships between and among clauses, placement of modifiers, and shifts in construction.

Rhetorical Skills

Strategy (16%). Questions in this category test how well you choose expressions appropriate to an essay's audience and purpose; judge the effect of adding, revising, or deleting supporting material; and choose effective opening, transitional, and closing sentences.

Organization (15%). Questions in this category test how well you organize ideas and judge the relevance of statements in context (making decisions about order, coherence, and unity).

Style (16%). Questions in this category test how well you select precise and appropriate words and images, maintain the level of style and tone in an essay, manage sentence elements for rhetorical effectiveness, and avoid ambiguous pronoun references, cliches, wordiness, and redundancy.

ACT Mathematics Test

The ACT Mathematics Test is a 60-question, 60-minute test designed to assess the mathematical skills students have typically acquired in courses taken up to the beginning of grade 12. The test presents multiple-choice questions that require you to use reasoning skills to solve practical problems in mathematics. Knowledge of basic formulas and computational skills are assumed as background for the problems, but complex formulas and extensive computation are not required. The material covered on the test emphasizes the major content areas that are prerequisites to successful performance in entry-level courses in college mathematics.

Use of calculators is permitted on the Mathematics Test. See page 4 for details.

Four scores are reported for the ACT Mathematics Test: a total test score based on all 60 questions, a subscore in Pre-Algebra/Elementary Algebra based on 24 questions, a subscore in Intermediate Algebra/Coordinate Geometry based on 18 questions, and a subscore in Plane Geometry/Trigonometry based on 18 questions.

Tips for Taking the ACT Mathematics Test

Pace yourself.

The ACT Mathematics Test contains 60 questions to be completed in 60 minutes. The maximum estimated time that should be spent on each question is 1 minute. If possible, spend less time on each question and use the remaining time allowed for this test to review your work and return to the questions on this test that were most difficult for you.

If you use a calculator, use it wisely.

Remember, all of the mathematics problems can be solved without using a calculator. In fact, some of the problems are best done without a calculator. Use good judgment in deciding when, and when not, to use a calculator. For example, for some problems you may wish to do scratch work to clarify your thoughts on the question before you begin using a calculator to do computations. For many problems, you may not want to use a calculator.

Solve the problem.

The best way to respond to each question in this test is to work out your solution to the problem. Writing space for scratch work usually is available in the test booklet, or you will be given scratch paper to use. You may wish to glance over the answer choices after reading the questions. However, working backwards from the answer choices provided takes a lot of time and seldom is effective.

Locate your solution among the answer choices.

Once you have solved the problem, look for your answer among the choices. If your answer is not included among the choices, carefully reread the problem to see whether you missed important information. Pay careful attention to the question being asked. If an equation is to be selected, check to see whether the equation you think is best can be transformed into one of the answer choices provided.

Make sure you answer the question.

The solutions to many questions in the test will involve several steps. Make sure your answer includes all of the necessary steps. Frequently, questions include answer choices that are based on incomplete solutions.

Make sure your answer is reasonable.

Sometimes an error in computation will result in an answer that is not practically possible for the situation described. Always think about your answer to determine whether it is reasonable.

Check your work.

You may arrive at an incorrect solution by making common errors in the problem-solving process. Thus, if there is time available before the end of the Mathematics Test, it is important that you reread the questions and check your answers to make sure they are correct.

Content Covered by the ACT Mathematics Test

Six content areas are included in the Mathematics Test: pre-algebra, elementary algebra, intermediate algebra, coordinate geometry, plane geometry, and trigonometry. The questions covering pre-algebra and elementary algebra make up the Pre-Algebra/Elementary Algebra subscore. The questions covering intermediate algebra and coordinate geometry make up the Intermediate Algebra/Coordinate Geometry subscore. And the Plane Geometry/Trigonometry subscore is based on the questions covering plane geometry and trigonometry. A brief description and the approximate percentage of the test devoted to each content area are given below.

Pre-Algebra/Elementary Algebra

Pre-Algebra (23%). Questions in this content area are based on basic operations using whole numbers, decimals, fractions, and integers; place value; square roots and approximations; the concept of exponents; scientific notation; factors; ratio, proportion, and percent; linear equations in one variable; absolute value and ordering numbers by value; elementary counting techniques and simple probability; data collection, representation, and interpretation; and understanding simple descriptive statistics.

Elementary Algebra (17%). Questions in this content area are based on properties of exponents and square roots, evaluation of algebraic expressions through substitution, using variables to express functional relationships, understanding algebraic operations, and the solution of quadratic equations by factoring.

Intermediate Algebra/Coordinate Geometry

Intermediate Algebra (15%). Questions in this content area are based on an understanding of the quadratic formula, rational and radical expressions, absolute value equations and inequalities, sequences and patterns, systems of equations, quadratic inequalities, functions, modeling, matrices, roots of polynomials, and complex numbers.

Coordinate Geometry (15%). Questions in this content area are based on graphing and the relations between equations and graphs, including points, lines, polynomials, circles, and other curves; graphing inequalities; slope; parallel and perpendicular lines; distance; midpoints; and conics.

Plane Geometry/Trigonometry

Plane Geometry (23%). Questions in this content area are based on the properties and relations of plane figures, including angles and relations among perpendicular and parallel lines; properties of circles, triangles, rectangles, parallelograms, and trapezoids; transformations; the concept of proof and proof techniques; volume; and applications of geometry to three dimensions.

Trigonometry (7%). Questions in this content area are based on understanding trigonometric relations in right triangles; values and properties of trigonometric functions; graphing trigonometric functions; modeling using trigonometric functions; use of trigonometric identities; and solving trigonometric equations.

ACT Reading Test

The Reading Test is a 40-question, 35-minute test that measures your reading comprehension as a product of your skill in referring and reasoning. That is, the test questions require students to derive meaning from several texts by (1) referring to what is explicitly stated and (2) reasoning to determine implicit meanings and to draw conclusions, comparisons, and generalizations. The test comprises four prose passages that are representative of the level and kinds of text commonly encountered in college freshman curricula; passages on topics in the social studies, the natural sciences, prose fiction, and the humanities are included. Each passage is preceded by a heading that identifies what type of passage it is (for example, "Prose Fiction"), names the author, and may include a brief note that helps in understanding the passage. Each passage is accompanied by a set of multiple-choice test questions. These questions do not test the rote recall of facts from outside the passage, isolated vocabulary items, or rules of formal logic. Rather, the test focuses upon the complex of complementary and mutually supportive skills that readers must bring to bear in studying written materials across a range of subject areas.

Three scores are reported for the ACT Reading Test: a total test score based on all 40 questions, a subscore in Social Studies/Sciences reading skills (based on the 20 questions in the social studies and natural sciences sections of the test), and a subscore in Arts/Literature reading skills (based on the 20 questions in the prose fiction and humanities sections of the test).

Tips for Taking the ACT Reading Test

Pace yourself.

The ACT Reading Test contains 40 questions to be completed in 35 minutes. If you spend 2–3 minutes reading each passage, then you will have about 35–41 seconds to answer each question. If possible, spend less time on the passages and the questions and use the remaining time allowed for this test to review your work and return to the questions on this test that were most difficult for you.

Read the passage carefully.

Before you begin answering a question, read the entire passage thoroughly. It is important that you read every sentence rather than skim the text. Be conscious of relationships between or among ideas. You may want to make notes about important ideas in the passage either in the test booklet or on the scratch paper provided.

Refer to the passage when answering the questions.

Answers to some of the questions will be found by referring to what is explicitly stated in the text. Other questions will require you to determine implicit meanings and to draw conclusions, comparisons, and generalizations. Refer to the passage before you answer any question.

Content Covered by the ACT Reading Test

The Reading Test is based on four types of reading selections: the social studies, the natural sciences, prose fiction, and the humanities. A subscore in Social Studies/Sciences reading skills is based on the questions in the social studies and the natural sciences sections of the test, and a subscore in Arts/Literature reading skills is based on the questions in the prose fiction and humanities sections of the test. A brief description and the approximate percentage of the test devoted to each type of reading selection are given below.

Social Studies (25%). Questions in this category are based on passages in the content areas of history, political science, economics, anthropology, psychology, and sociology.

Natural Sciences (25%). Questions in this category are based on passages in the content areas of biology, chemistry, physics, and physical sciences.

Prose Fiction (25%). Questions in this category are based on intact short stories or excerpts from short stories or novels.

Humanities (25%). Questions in this category are based on passages in the content areas of art, music, philosophy, theater, architecture, and dance.

ACT Science Reasoning Test

The Science Reasoning Test is a 40-question, 35-minute test that measures the interpretation, analysis, evaluation, reasoning, and problem-solving skills required in the natural sciences.

The test presents seven sets of scientific information, each followed by a number of multiple-choice test questions. The scientific information is conveyed in one of three different formats: data representation (graphs, tables, and other schematic forms), research summaries (descriptions of several related experiments), or conflicting viewpoints (expressions of several related hypotheses or views that are inconsistent with one another). The questions require you to recognize and understand the basic features of, and concepts related to, the provided information; to examine critically the relationship between the information provided and the conclusions drawn or hypotheses developed; and to generalize from given information to gain new information, draw conclusions, or make predictions. The use of calculators is **not** permitted on the Science Reasoning Test.

One score is reported for the ACT Science Reasoning Test: a total test score based on all 40 questions.

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Tips for Taking the ACT Science Reasoning Test

Pace yourself.

The ACT Science Reasoning Test contains 40 questions to be completed in 35 minutes. If you spend about 2 minutes reading each passage, then you will have about 30 seconds to answer each question. If possible, spend less time on the passages and the questions and use the remaining time allowed for this test to review your work and return to the questions on this test that were most difficult for you.

Read the passage carefully.

Before you begin answering a question, read the scientific material provided. It is important that you read the entire text and examine any tables, graphs, or figures. You may want to make notes about important ideas in the information provided, either in the test booklet or on the scratch paper provided. Some of the information sets will describe experiments. You should consider the experimental design, including the controls and variables, because questions are likely to address this component of scientific research.

Note different viewpoints in passages.

Some material will present conflicting points of view, and the questions will ask you to distinguish among the various viewpoints. It may be helpful for you to make notes summarizing each viewpoint, either next to that section in your test booklet or on the scratch paper provided. For questions that ask you to compare viewpoints, these notes will help you answer more quickly.

Content Covered by the ACT Science Reasoning Test

The content of the Science Reasoning Test includes biology, chemistry, physics, and the earth/space sciences (for example, geology, astronomy, and meteorology). Advanced knowledge in these subjects is not required, but background knowledge acquired in general, introductory science courses may be needed to answer some of the questions. The test emphasizes scientific reasoning skills rather than recall of scientific content, skill in mathematics, or reading ability. The scientific information is conveyed in one of three different formats.

Data Representation (38%). This format presents graphic and tabular material similar to that found in science journals and texts. The questions associated with this format measure skills such as graph reading, interpretation of scatter plots, and interpretation of information presented in tables.

Research Summaries (45%). This format provides descriptions of one or more related experiments. The questions focus upon the design of experiments and the interpretation of experimental results.

Conflicting Viewpoints (17%). This format presents expressions of several hypotheses or views that, being based on differing premises or on incomplete data, are inconsistent with one another. The questions focus upon the understanding, analysis, and comparison of alternative viewpoints or hypotheses.

3

What to Expect on the Test Day

Identification Required

You are to report to the test center at 8:00 A.M. If your admission ticket does not list a specific room, test supervisory personnel or posted signs will direct you to the testing room. At check-in, you will be required to show *BOTH* your admission ticket and acceptable ID. See ID requirements on page 5 of this booklet.

Dos and Don'ts

In the testing room, the supervisor or proctor will direct you to a seat. If you need a left-handed desk, tell your supervisor as you enter. Only pencils, a calculator (for the Mathematics Test only), and your admission ticket will be allowed on your desk. Scratch paper (unless provided by the test supervisor), notes, slide rules, and foreign language or other dictionaries are not allowed in the testing room. You will be required to put all other personal belongings away. You may not eat, use tobacco in any form, or drink in the testing room. You must abide by the rules of the institution where you are testing. Do not leave the testing room after you have been admitted.

Relax just before the tests. Take a few deep breaths, tense and relax your muscles, and think about pleasant things.

Test Preliminaries

The testing session will begin as soon as all examinees present at 8:00 A.M. are checked in. Listen carefully to all directions read by the supervisor. Ask questions if you do not understand what you are to do. It is very important that you *follow all directions* carefully. For instance, if you do not copy the information from your admission ticket onto your answer document accurately, or fill in the correct ovals, your answer document will not match your registration record—and the reporting of your scores will take three to five weeks longer than usual to process.

After you have completed side 1 of the answer document, your admission ticket will be collected and you will receive a test booklet. You will be told to read the directions printed on the cover, then asked to write the booklet number and test form at the top of side 2 of the answer document. It is extremely important that you fill in the correct ovals for your test booklet number and for the test form you are taking because these determine which answer key will be used to score your answer document. The supervisor will then tell you when to open your test booklet and begin work.

Taking the Tests

As you are working, keep your eyes on your own test booklet and answer document. If you have a question, raise your hand, but do not look around.

It is important that you understand what is considered cheating on the ACT Assessment. If you are involved in any of the actions listed below, you will have to return your test materials and leave the test center. You are considered to be cheating if you:

- attempt to fill in any ovals after time is called on any test (You must put down your pencil when time is called.)
- look at another examinee's test booklet or answer document
- give or receive assistance
- look back at a previous test on which time has been called
- look ahead at another test
- use any notes or reference books (e.g., dictionary)
- share a calculator with another examinee
- use a calculator to share or exchange information
- use a calculator on any test other than the Mathematics Test
- attempt to store test materials, including test questions or answers, in your calculator's memory to remove them from the testing room

All of the above activities are considered cheating. If you are observed cheating, your answer document will **not** be scored and you will be dismissed from the test center.

If you finish before time is called, review your work on the test you have just finished. Do **not** return to an earlier test and do not work ahead. If you are satisfied with your responses, place your answer document inside your test booklet and close it. Sit quietly until the supervisor gives you additional instructions.

You will have a short break after the first two tests. Do not leave the building during the break period because some buildings have automatic locking doors, and you may be locked out. You must ask permission to leave the room during testing to go to the restroom; you will not be given time to make up for the time you miss.

On certain test dates, ACT administers five tests. One of the five is included for developmental purposes and is not counted toward your score.

At the conclusion of the session, you will be asked to read and sign a statement certifying truthful identification of yourself. You will be required to sit quietly until you are dismissed. After all answer documents and test booklets have been collected and counted, the supervisor will dismiss you.

Special Situations

If you become ill and have to leave the center before finishing the ACT, tell the supervisor whether you want to have your answer document scored. If you do not want your answer document scored, ask the supervisor to return your admission ticket. You may reregister for a later test date in the current testing year (through June).

If you decide *after* you have finished the ACT that you do not want it scored, tell the supervisor *before* you leave the test center. You need not give a reason. However, once you have broken the seal on your test booklet, you cannot request a refund or reregistration for a later test date.

Test Information Release

On certain national test dates, you may obtain (for an additional fee) a copy of the test questions, a copy of your answers, a list of correct answers, and scoring instructions. This service is not available for all dates or for other types of testing, so if you want it, be sure to check the registration guide, *Registering for the ACT Assessment*, and register for a test date on which it is available. The information will be mailed 8 to 12 weeks **after** the test date.

4

Taking the Practice Test

The practice test, which is provided to help you become familiar with the ACT, will be most helpful if you take it under conditions that are as similar as possible to those you will experience on the actual test day.

The following tips will help you make the most of the practice test.

- The four ACT tests require a total of 2 hours and 55 minutes. Try to take them in one sitting, without interruption.
- Sit at a desk with good lighting. You will need three No. 2 pencils with erasers. You may not use highlight pens. Remove all books and other aids from your desk. On the test day, you will not be allowed to use references or notes. If you test at a national test center, you won't need scratch paper because each page of the Mathematics Test will provide a blank column that you can use for scratch work. Otherwise, you will be provided with scratch paper.
- **If you plan to use a calculator on the Mathematics Test, review the details about permissible calculators on page 4. Use a calculator with which you are familiar for both the practice test and on the test day. You may use any four-function, scientific, or graphing calculator on the Mathematics Test, as long as the calculator has none of the features included in the list on page 4.**
- Use a kitchen timer or a clock so you can time yourself on the four tests. Set your timer for five minutes less than the allotted time for each test so you can get used to the five-minute warning.
- Allow yourself only the time permitted for each test.
- Detach and use the sample answer sheet on pages 11–12.
- Read the general test directions on the first page of the practice test. These are the same directions that will appear on your test booklet on the test day. After you have read the directions, begin taking the practice test.
- After you finish the practice test, use the scoring keys and conversion tables on pages 56–62 of this booklet to score your practice test.

ACT ASSESSMENT *1996-97 National Answer Sheet*

SIDE 1

A NAME, ADDRESS, AND TELEPHONE (Please print.)

Last Name | First Name | MI (Middle Initial)

House Number and Street

City | State | ZIP Code

Area Code | Number

ACT

P.O. BOX 168, IOWA CITY, IOWA 52243-0168

MATCHING INFORMATION

Enter the information in blocks B, C, and D, EXACTLY as it appears on your test center admission ticket, even if any part of this information is missing or incorrect. Fill in the corresponding ovals. Leave block E blank unless you are given special instructions.

B FIRST FIVE LETTERS OF LAST NAME

C SOCIAL SECURITY NUMBER (OR ACT ID NUMBER)

D DATE OF BIRTH

Month: Jan., Feb., Mar., Apr., May, June, July, Aug., Sep., Oct., Nov., Dec.

Day

Year

E

IM-(A) 000000-001 654321 Printed in U.S.A.

If the information on your admission ticket is complete and correct, do NOT mark in blocks F, G, H, and I. Wait for further instructions.

If any corrections are necessary, complete ONLY those blocks below for which the information on your test center admission ticket is INCOMPLETE or INCORRECT. Leave the other blocks blank.

F NAME CORRECTION

Last Name | First Name | MI

G SOCIAL SECURITY NUMBER CORRECTION

H DATE OF BIRTH CORRECTION

Month: Jan., Feb., Mar., Apr., May, June, July, Aug., Sep., Oct., Nov., Dec.

Day

Year

I HIGH SCHOOL CODE CORRECTION

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IC-3715.6

You may wish to remove this sample answer sheet from the booklet to use in a practice test session.

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SIDE 2

BOOKLET NUMBER

FORM

BE SURE TO FILL IN THE CORRECT FORM OVAL.

○ 9652C

TEST 1

1	11	21	31	41	51	61	71		
2	12	22	32	42	52	62	72		
3	13	23	33	43	53	63	73		
4	14	24	34	44	54	64	74		
5	15	25	35	45	55	65	75		
6	16	26	36	46	56	66			
7	17	27	37	47	57	67			
8	18	28	38	48	58	68			
9	19	29	39	49	59	69			
10	20	30	40	50	60	70			

TEST 2

1	9	17	25	33	41	49	57		
2	10	18	26	34	42	50	58		
3	11	19	27	35	43	51	59		
4	12	20	28	36	44	52	60		
5	13	21	29	37	45	53			
6	14	22	30	38	46	54			
7	15	23	31	39	47	55			
8	16	24	32	40	48	56			

TEST 3

1	7	13	19	25	31	37			
2	8	14	20	26	32	38			
3	9	15	21	27	33	39			
4	10	16	22	28	34	40			
5	11	17	23	29	35				
6	12	18	24	30	36				

TEST 4

1	7	13	19	25	31	37			
2	8	14	20	26	32	38			
3	9	15	21	27	33	39			
4	10	16	22	28	34	40			
5	11	17	23	29	35				
6	12	18	24	30	36				

I hereby certify that I have truthfully identified myself on this form. I understand that the consequences of falsifying my identity include cancellation of my scores.

Your Signature

Today's Date

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961280

Practice Test

FORM 9652C

The ACT Assessment

DIRECTIONS

This booklet contains tests in English, Mathematics, Reading, and Science Reasoning. These tests measure skills and abilities highly related to high school coursework and success in college. *CALCULATORS MAY BE USED ON THE MATHEMATICS TEST ONLY.*

The questions in each test are numbered, and the suggested answers for each question are lettered. On the answer sheet, the rows of ovals are numbered to match the questions, and the ovals in each row are lettered to correspond to the suggested answers.

For each question, first decide which answer is best. Next, locate on the answer sheet the row of ovals numbered the same as the question. Then, locate the oval in that row lettered the same as your answer. Finally, fill in the oval completely. Use a soft lead pencil and make your marks heavy and black. *DO NOT USE A BALLPOINT PEN.*

Mark only one answer to each question. If you change your mind about an answer, erase your first mark thoroughly before marking your new answer. For each question, make certain that you mark in the row of ovals with the same number as the question.

Only responses marked on your answer sheet will be scored. Your score on each test will be based only on the number of questions you answer correctly during the time allowed for that test. You will NOT be penalized for guessing. *IT IS TO YOUR ADVANTAGE TO ANSWER EVERY QUESTION EVEN IF YOU MUST GUESS.*

You may work on each test ONLY when your test supervisor tells you to do so. If you finish a test before time is called for that test, you should use the time remaining to reconsider questions you are uncertain about in that test. You may NOT look back to a test on which time has already been called, and you may NOT go ahead to another test. To do so will disqualify you from the examination.

Lay your pencil down immediately when time is called at the end of each test. You may NOT for any reason fill in ovals for a test after time is called for that test. To do so will disqualify you from the examination.

Do not fold or tear the pages of your test booklet.

DO NOT OPEN THIS BOOKLET UNTIL TOLD TO DO SO.

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ENGLISH TEST

45 Minutes—75 Questions

DIRECTIONS: In the five passages that follow, certain words and phrases are underlined and numbered. In the right-hand column, you will find alternatives for each underlined part. You are to choose the one that best expresses the idea, makes the statement appropriate for standard written English, or is worded most consistently with the style and tone of the passage as a whole. If you think the original version is best, choose "NO CHANGE."

You will also find questions about a section of the passage, or about the passage as a whole. These questions do not refer to an underlined portion of the passage, but rather are identified by a number or numbers in a box.

For each question, choose the alternative you consider best and fill in the corresponding oval on your answer document. Read each passage through once before you begin to answer the questions that accompany it. You cannot determine most answers without reading several sentences beyond the question. Be sure that you have read far enough ahead each time you choose an alternative.

PASSAGE I

"Krazy Kat" Comics

[1]

The most widely acclaimed comic strip of all time is probably George Herriman's "Krazy Kat" and[1] Herriman was a staff artist for William Randolph Hearst's New York *Journal*. Hearst was convinced that comic strips were the key to luring readers away from Joseph Pulitzer's New York *World*. Therefore,[2] he hired the most talented and innovative comic strip artists he could find. Between 1907 and 1910,[3] George Herriman developed several strips for Hearst. One of them "The Family Upstairs," included an[4] inch-tall mini-strip across the bottom about a cat and a mouse who lived in the house's woodwork. After three years, this mini-strip blossomed into[5] "Krazy Kat," the first comic strip to obtain true cult status.

[2]

[1] On the surface it's[6] premise was simple. [2] Ignatz Mouse devoted his life to bombarding Krazy Kat with bricks. [3] Krazy Kat, blinded by

1. A. NO CHANGE
   B. Kat."
   C. Kat,"
   D. Kat" but

2. F. NO CHANGE
   G. However,
   H. Nevertheless,
   J. In spite of this,

3. A. NO CHANGE
   B. Between the years stretching from 1907 to
   C. Between the years extending from 1907 and
   D. It was during the years extending from 1907 to

4. F. NO CHANGE
   G. them "The Family Upstairs" included
   H. them, "The Family Upstairs," included
   J. them "The Family Upstairs" included,

5. A. NO CHANGE
   B. (Place after *this* and correct capitalization)
   C. (Place after *comic strip* and correct capitalization)
   D. (Place after *cult* and correct capitalization)

6. F. NO CHANGE
   G. there
   H. its
   J. its'

love, believed this to be an expression of affection.

[4] Inevitable Mouse succeeded in his efforts "to Krease that Kat's bean with a brick." [5] Ignatz was then arrested and jailed by Offissa Pupp, who was, in turn, in love with, Krazy Kat. [6] "Krazy Kat" featured Ignatz Mouse, Krazy Kat, and Offissa Pupp. [9]

[3]

The stories take place in a surreal landscape. In the background, strangely shaped stone monoliths and aberrant alien plants mutate from panel to panel. They appear and disappear as though they controlled their own fates. While the characters seem destined to endlessly reenact the same scenario. But the strip was able to transcend the limitations of its genre: it spoke lyrically of the human condition. [11]

[4]

"Krazy Kat" didn't capture the public's imagination immediately, but Hearst loved the strip and ignored his editor's advice to cancel it. Instead, he moved it to the arts and drama section, where it attracted a devoted following. A following included President Woodrow Wilson and the poet e. e. cummings. "His life is warped with fancy, woofed with dreams," Offissa Pupp said of the Kat. The strip was too.

7. A. NO CHANGE
   B. Inevitably as he was,
   C. Most inevitable,
   D. Inevitably,

8. F. NO CHANGE
   G. love with;
   H. love with
   J. love, with

9. For the sake of unity and coherence, Sentence 6 should be placed:
   A. where it is now.
   B. before Sentence 1.
   C. before Sentence 3.
   D. before Sentence 4.

10. F. NO CHANGE
    G. fates? While
    H. fates! While
    J. fates, while

11. Given that all are true, which of the following sentences would be the most appropriate introductory sentence for Paragraph 3?
    A. "Krazy Kat" does not appear in newspapers today.
    B. "Krazy Kat" was more complex and sophisticated than its premise indicates.
    C. There are no plans, at the moment, to make a movie based on the comic strip "Krazy Kat."
    D. When a word in "Krazy Kat" began with the letter *c*, Herriman almost always replaced it with the letter *k*, though this was not the case for words beginning with *ch*.

12. F. NO CHANGE
    G. This following included
    H. It then included
    J. OMIT the underlined portion.

13. A. NO CHANGE
    B. additionally was.
    C. was in addition.
    D. in addition, too.

Questions 14 and 15 ask about the preceding passage as a whole.

14. The writer wishes to add the following information to the essay:

> Hearst paid handsomely to get the best cartoonist because, as one of his artists later explained, "Hearst didn't care about money, all he cared about was beating Pulitzer."

The new sentence would most logically be placed in Paragraph:

F. 1, because Paragraph 1 discusses Hearst's competition with Pulitzer.
G. 2, because Paragraph 2 introduces the reader to the main characters in "Krazy Kat."
H. 2, because Paragraph 2 describes the basic premise of "Krazy Kat."
J. 3, because Paragraph 3 anticipates the mention in Paragraph 4 of Hearst's commitment to "Krazy Kat" and his refusal to cancel it even though it was initially unpopular.

15. Suppose the writer had been assigned to write a brief essay describing the impact newspaper sales wars had on the evolution of the comic strip. Would this essay successfully fulfill the assignment?

A. Yes, because the essay focuses on how talented and innovative comic-strip artists improved sales for the two competitors.
B. Yes, because the essay focuses on the innovative and sophisticated techniques that George Herriman utilized in "Krazy Kat."
C. No, because the essay focuses on "Krazy Kat," and the competition for the newspaper market is only mentioned in passing.
D. No, because the essay focuses on the failure of "Krazy Kat" to initially attract a wide readership.

PASSAGE II

Valet Parking

[1]

Eating out in Los Angeles is expensive, so food accounts for only a portion of the cost. Those who dine out are often required to utilize the valet parking services offered by many restaurants. In some instances, the price of parking can equal the price of a modest meal.

[2]

Valet parking is widespread in Los Angeles. Although not every restaurant in Los Angeles offers this service, somewhere in the city every type of restaurant do. While fast-food eateries and four-star establishments may serve wildly different cuisine, and the prices apart from their respective menus may also be wildly different, then each may require its patrons to pay

16. F. NO CHANGE
G. but
H. then
J. thus

17. A. NO CHANGE
B. had.
C. did.
D. does.

18. F. NO CHANGE
G. of respectable
H. on their respective
J. as respective

19. A. NO CHANGE
B. if it
C. each may
D. may each

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for the privilege of having a total stranger park their
20

cars. 21

[3]

Restaurants typically cooperate with independently owned valet parking services. Valet parking costs can

exceed five dollars, depending on the location, if not
22

including a tip for the helpful valet.

[4]

[1] Valet parking services simply recognized this

fact to cash to put themselves in position. [2] The answer
23

is simple, the city
24
contains a huge number of well-to-do

residences which
25
like to eat out often. [3] You may wonder why valet parking is such a big business in Los Angeles. [4] It's said that many people actually like the idea of valet parking; for them, having someone else park their car adds to the glamour of dining out. 26

[5]

Many others, however, think
27
that valet parking is an expensive nuisance. Unfortunately for

20. Which of the alternatives most strongly supports the notion that valet parking is an impersonal phenomenon?

- **F.** NO CHANGE
- **G.** person
- **H.** recent acquaintance
- **J.** young adult

21. The writer considers adding the following sentence after Paragraph 2's second sentence:

> For some reason, though, only rarely do fish places have valet parking.

The most logical reason for the writer to *reject* such an addition in this paragraph is because the sentence:

- **A.** does not add crucial information, and it disrupts the logical flow of the paragraph.
- **B.** undermines the validity of the preceding sentence since it does not single out a particular type of restaurant.
- **C.** adds too much of a negative emphasis to the essay.
- **D.** suggests that it might be less expensive to eat in a fish place than any other type of restaurant.

22.

- **F.** NO CHANGE
- **G.** thus
- **H.** not
- **J.** whether

23.

- **A.** NO CHANGE
- **B.** and put themselves into position to cash in.
- **C.** and themselves put into position to cash in.
- **D.** to put themselves into cash in position.

24.

- **F.** NO CHANGE
- **G.** simple the city,
- **H.** simple the city
- **J.** simple: the city

25.

- **A.** NO CHANGE
- **B.** residences who
- **C.** residents who
- **D.** residencies that

26. Which of the following sequences of sentences will make Paragraph 4 most logical?

- **F.** NO CHANGE
- **G.** 1, 3, 4, 2
- **H.** 1, 4, 2, 3
- **J.** 3, 2, 1, 4

27.

- **A.** NO CHANGE
- **B.** others however think,
- **C.** others, think however
- **D.** others, however; think

them though; parking on Los Angeles's crowded
28
streets is often a difficult proposition. In the trendier areas, where the hot restaurants are likely to be found and where large crowds are the norm, valet parking is more than a convenience—it's almost a
29
necessity. You either pay up or walk *too many* blocks to the restaurant at which you hope to eat. Most people pay up.

28. F. NO CHANGE
    G. their parking, though,
    H. parking them, though,
    J. them, though, parking

29. A. NO CHANGE
    B. a convenience when it's
    C. convenient—its
    D. convenient yet

Question 30 asks about the preceding passage as a whole.

30. The writer is considering adding the following parenthetical sentence to the essay:

    (The hourly wage paid to valets is low; how well they live depends on the tipping behavior of patrons.)

    If added, this sentence should be placed after the last sentence of Paragraph:

    F. 2.
    G. 3.
    H. 4.
    J. 5.

PASSAGE III

Discovering the Power of Words

[1]

Shortly after our daughter was born, my wife returned to her job, and leaving each morning for her office. I
31

worked at home, and it was a consequence, for the first
32
few months of our daughter's life, I was the daytime caregiver.

[2]

Each day my daughter and I went out together to run errands. And each day brought a new lesson about the power of words. Imperceptibly, postal clerks would joke
33
about my having been "stuck babysitting." A grocery

31. A. NO CHANGE
    B. job, leaving
    C. job; leaving
    D. job. Leaving

32. F. NO CHANGE
    G. because of which,
    H. resulting,
    J. so,

33. A. NO CHANGE
    B. Fortunately, postal
    C. Unnoticeably, postal
    D. Postal

checker may comment that Mom must have needed some "beauty sleep," and so "poor Papa" was sent out shopping.

[3]

All these people thought that my active parenting was odd. They assumed parenting had been foisted upon me. What I remember most about their comments were that I began to believe them and to doubt my ability to be as good a parent than what my wife might be. Their assumptions and their words, appropriate or not, had power.

[4]

Now that our daughter is three, I've noticed how words empower and enchant her. She listens with an eagle eye out for subtleties, tries out the power of rude words, and, in the end, takes everything all too literally. That's the reason which I'm disturbed when I hear adults tell her that. Although she might like to run and climb with the boys now, soon she will want to play house with the girls.

[5]

Having grown up in the feminist era, comments about what is appropriate behavior for girls, boys, women, and men I did not now expect to hear. I must admit, though, that when *chairperson, mail carrier,* and *police officer* were being pressed into the language to replace *chairman, mailman,* and *policeman,* I had my doubts; what I doubted was that words could

34. F. NO CHANGE
G. may have
H. might
J. might have

35. A. NO CHANGE
B. is
C. was
D. OMIT the underlined portion.

36. F. NO CHANGE
G. than
H. as
J. OMIT the underlined portion.

37. A. NO CHANGE
B. words appropriate or not,
C. words, appropriate or not
D. words appropriate or not

38. F. NO CHANGE
G. with an eagle eye
H. like an eagle with its famed, accurate eye
J. OMIT the underlined portion.

39. A. NO CHANGE
B. cause for why
C. for which reason
D. why

40. F. NO CHANGE
G. her. Although,
H. her, although,
J. her that although

41. A. NO CHANGE
B. comments about what is appropriate behavior for girls, boys, women, and men were not expected now.
C. I did not now expect to hear comments about what is appropriate behavior for girls, boys, women, and men.
D. it would be improbable and unexpected now for there to be comments about what is appropriate behavior for girls, boys, women, and men.

effect change. Yet I see now with my daughter that
42
language does change what we perceive as possible and appropriate. A mailman is not a woman; a mail carrier might well be a woman. 43

42. F. NO CHANGE
G. Consequently,
H. Moreover,
J. Therefore

43. The writer wishes to conclude the essay by encouraging his readers to use language that does not restrict appropriate behavior by gender. Which of the following best accomplishes that goal?

A. Please use good language!
B. I hope the language we use will create possibilities, not limitations, for our children. A primary caregiver might well be a man.
C. There, remember "Little pitchers have big ears" and today's children are the leaders of tomorrow.
D. A primary caregiver might well be a man. Finally, therefore, I would strongly encourage you to be a good role model, because children do what we do, not what we say.

Questions 44 and 45 ask about the preceding passage as a whole.

44. The writer wishes to add the following detail to the essay:

> One person actually stopped me in the street to say, "Hey, Dad, what would your wife say if she saw her baby out without a hat?"

Considering the information offered in and the focus of each of the paragraphs, one would most logically insert this sentence in Paragraph:

F. 1, before what is now the last sentence.
G. 2, after what is now the last sentence.
H. 4, before the first sentence.
J. 4, after what is now the last sentence.

45. The writer wishes to include the following observation in the essay:

> They also assumed that whether by nature or through years of practice on dolls, my wife automatically knew about booties and birthmarks, burping and bonnets, whereas I automatically knew nothing.

This sentence would most logically fit:

A. in Paragraph 1.
B. in Paragraph 3.
C. in Paragraph 4.
D. before the first sentence in Paragraph 5.

PASSAGE IV

Why Collect Books?

[1]

The next time you paw through a stack of books at a garage sale, take a closer look. The novel selling, for a dime, might be worth its weight
46
in gold. Like china dolls, and furniture and old books,
47
are prized by collectors. Depending on its age, condition,

46. F. NO CHANGE
G. novel selling for a dime
H. novel selling for a dime,
J. novel, selling for a dime

47. A. NO CHANGE
B. dolls and furniture for old books,
C. dolls, and furniture, and old books,
D. dolls and furniture, old books

significance, and rarity, for a book that originally sold
48
for $2.95 might bring thousands of dollars at auction.

For the knowledgeable, sharp-eyed buyer, a pile of dusty
49

books are there treasure.
50

[2]

[1] Book collecting is a game anyone can play. [2] To begin, simply decide which books interest you and then start acquiring a few titles. [3] Collectors have established imaginable markets for nearly every type of
51
book. [4] Some specialize in children's literature; others devote themselves to aviation. [5] Incunabula—books produced before the sixteenth century—are among the rarest and most expensive prizes. [6] However, modern
52
novels of literary significance offer an affordable entry into the game. [53]

48. F. NO CHANGE
G. and rarity, a
H. rarity, each
J. and rarity for a

49. A. NO CHANGE
B. But the
C. However, as a
D. Since the

50. F. NO CHANGE
G. could contain a
H. would be their
J. containing a

51. A. NO CHANGE
B. (Place after *markets*)
C. (Place after *every*)
D. (Place after *type*)

52. F. NO CHANGE
G. Although
H. Such as, for example,
J. Yes,

53. Suppose that this essay was written to introduce readers to book collecting and to encourage their participation as collectors. Would adding the following sentence after Sentence 3 in Paragraph 2 help the writer fulfill that purpose?

> There are many markets out there, one for almost every sort of book you could think of.

A. Yes, because the sentence offers highly detailed information that should be mentioned at this point in the essay.
B. Yes, because the writer apparently thinks readers of this essay could not think of many types of markets.
C. No, because the sentence might make book collecting seem like too strange an activity for most readers to enjoy.
D. No, because the sentence is largely redundant and, so, contributes little to the essay's persuasiveness.

[3]

[1] Unlike some collectibles, rare books are relatively easy to acquire. [54] [2] Garage and rummage sales are good sources, plus their are used-book stores and sidewalk sales around college campuses. [3] Still, collectors must take care. [4] A first edition of the same book, in mint condition, commands a high price. [5] Old books are plentiful, but not all are valuable; some are worth only the dime they're selling for. [6] While your uncle's dog-eared paperback reprinting of Hemingway's *The Sun Also Rises* might be his favorite, to a serious collector of interest. [7] If the novel is signed by Hemingway himself, your so much the better. [58]

54. Suppose the writer wanted to support the claim made in Sentence 1 about the relative ease of finding collectible books. Which of the following sentences would best fulfill that purpose?
    - F. Books are lightweight, portable, and only a little dusty, which means you can carry them most places.
    - G. Isn't it too much trouble to simply look through a stack of books and see what's there?
    - H. Compared to one-of-a-kind paintings or gems, rare books are obtainable and affordable.
    - J. Each type of collecting poses its own set of difficulties, and book collecting has many drawbacks.

55. A. NO CHANGE
    B. but it's the same thing with
    C. and so are
    D. because of

56. F. NO CHANGE
    G. their is interest.
    H. it is of little interest.
    J. things can be interesting.

57. A. NO CHANGE
    B. because it's
    C. its
    D. then

[4]

Most collectors are in the game for reasons other than profit. The hunt provides its own rewards, as does the pleasure of reading. If the books increase in value, that's all well and good. Most collectors follow one rule above all: Collect the books that you most want to read. Then an unread book has no real value, no matter what

58. For the sake of unity and coherence, Sentence 4 would best be placed:
    - F. where it is now.
    - G. before Sentence 1.
    - H. before Sentence 3.
    - J. before Sentence 7.

59. A. NO CHANGE
    B. Although
    C. After all,
    D. Whenever

an auctioneer might say. [60]

60. Which of the following sentences most accurately restates the point of Paragraph 4?
    F. An unopened and undamaged book is a thing of beauty.
    G. Reading books is more important than collecting them.
    H. Only sometimes can you judge a book by its cover.
    J. Books that have beautiful illustrations have the greatest value to collectors.

PASSAGE V

The Hot Springs of Iceland

[1]

Although Iceland touches the Arctic Circle and [61] contains many immense, permanent glaciers (Vatnajökull, for example, covers 3,125 square miles), the country is more interesting with heat. Specifically, Iceland is one of [62] the earth's most volcanically active areas. Beneath the so-called land of ice boil thousands of hot springs heated by volcanic fires. Since [63] hot water serves the country well.

61. A. NO CHANGE
    B. Circle; and
    C. Circle—and
    D. Circle, and,

62. F. NO CHANGE
    G. interesting when it has
    H. interesting for its
    J. interested in it's

63. A. NO CHANGE
    B. That is
    C. Whose
    D. That

[2]

In 1930, it's partly because its forests had been so [64] depleted, Iceland began to develop this geothermal energy source bubbling beneath its surface. Outside of Reykjavik, Iceland's capital, [65] huge holes were bored into the earth at depths of between 450 and 2,500 feet.

Enormous pipes were bringing the water to seven [66] 250,000-gallon tanks on a hill above the city. This massively public [67] works project was not finished until 1943.

64. F. NO CHANGE
    G. in part
    H. that's partly
    J. for its part

65. A. NO CHANGE
    B. Reykjavik, Icelands capital,
    C. Reykjavik, Iceland's capital
    D. Reykjavik Iceland's capital,

66. F. NO CHANGE
    G. had brought
    H. were to bring
    J. will bring

67. A. NO CHANGE
    B. massed public
    C. massive publicity
    D. massive public

[3]

Even though the water loses some heat as it is pumped from the wells, through the pumping stations, and on to consumers, the water still arrives at faucets at a temperature of approximately 175 degrees Fahrenheit.

[4]

[1] This hot water is used to heat homes, offices, schools, and, yes, swimming pools. [2] One would hardly expect swimming to be the national sport of a country named Iceland, because in this country heated pools are common. [3] On the coldest winter days, Icelanders regularly swim in open-air pools that need cold water added to bring the temperature *down* to 86 degrees. [4] Thick mists rise from the pools, the water obscures.

[5]

[1] In addition to generating inexpensive and plentiful natural energy and providing hot water for the country's citizens, Icelands volcano's also produce some spectacular geysers. [2] The oldest of these, Geysir, was, like Yellowstone's Old Faithful, famed for its regularity. [3] Now it lies dormant. [4] Nearby, a younger geyser is replaced, a new offering from the boiling springs that bring the warm heat to a land of ice. [74]

68. F. NO CHANGE
    G. whereas
    H. yet
    J. and, in fact,

69. A. NO CHANGE
    B. obscuring.
    C. obscuring the water.
    D. obscurant water.

70. F. NO CHANGE
    G. Icelands volcanoes
    H. Iceland's volcanoes
    J. Iceland's volcanoes'

71. A. NO CHANGE
    B. these Geysir, was
    C. these Geysir was
    D. these, Geysir was,

72. F. NO CHANGE
    G. has replaced it,
    H. lies in replacement,
    J. OMIT the underlined portion.

73. A. NO CHANGE
    B. gift of
    C. offering bequeathed by warmth and
    D. generosity of comfortable

74. The writer wishes to add the following sentence, for emphasis, to Paragraph 4 or Paragraph 5:

    You could have set your watch by it!

    If added, this sentence would most logically be placed before Sentence:

    F. 3 in Paragraph 4.
    G. 4 in Paragraph 4.
    H. 2 in Paragraph 5.
    J. 3 in Paragraph 5.

Question 75 asks about the preceding passage as a whole.

75. The writer wishes to add the following comment to the essay:

> (The possibility of having to rely on foreign energy sources was not appealing.)

If added, this sentence would most logically be placed after the first sentence of Paragraph:

A. 2.
B. 3.
C. 4.
D. 5.

END OF TEST 1

STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

MATHEMATICS TEST

60 Minutes—60 Questions

DIRECTIONS: Solve each problem, choose the correct answer, and then fill in the corresponding oval on your answer document.

Do not linger over problems that take too much time. Solve as many as you can; then return to the others in the time you have left for this test.

You are permitted to use a calculator on this test. You may use your calculator for any problems you choose, but some of the problems may best be done without using a calculator.

Note: Unless otherwise stated, all of the following should be assumed.

1. Illustrative figures are NOT necessarily drawn to scale.
2. Geometric figures lie in a plane.
3. The word *line* indicates a straight line.
4. The word *average* indicates arithmetic mean.

---

1. The greatest common divisor of 84, 90, and 66 (that is, the largest exact divisor of all three numbers) is:

A. 6
B. 12
C. 18
D. 36
E. 90

2. If a circle's diameter is 5 meters, what is that circle's radius, in meters?

F. $2\frac{1}{2}$
G. 5
H. $\frac{5}{2}\pi$
J. 5π
K. $\frac{25}{4}\pi$

3. If you've traveled x miles per hour for 3 hours, how many miles have you traveled?

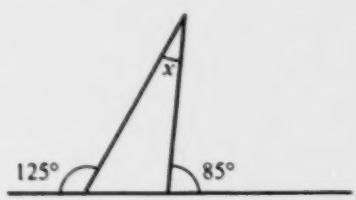
A. $\frac{3}{x}$
B. $\frac{x}{3}$
C. $3x$
D. $60x$
E. $180x$

4. $(2ab^2)^3(3a^2b)^2$ is equivalent to:

F. $6a^5b^7$
G. $6a^{12}b^{12}$
H. $36a^7b^7$
J. $72a^7b^8$
K. $6^5a^{12}b^{12}$

5. In the figure below, what is the value of x ?

A. 5°
B. 30°
C. 40°
D. 55°
E. 60°



6. What is the solution value of x for the equation $3(x-2) = 9x - 5$?

F. -6
G. $-\frac{11}{12}$
H. $-\frac{1}{6}$
J. $\frac{1}{2}$
K. 1

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GO ON TO THE NEXT PAGE.

7. An architect is drawing a scaled blueprint of an apartment building that is to be 150 feet wide and 200 feet long. On the drawing, if the building is 48 inches long, how many inches wide should it be?

A. $12\frac{1}{2}$

B. 16

C. $16\frac{2}{3}$

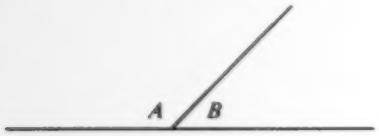
D. 36

E. $37\frac{1}{2}$

8. What is the 7th term in this sequence of "triangular" numbers, defined by the figures below: 1, 3, 6, 10, . . . ?

F. 7
G. 22
H. 25
J. 28
K. 40

9. One angle, $\angle A$, has 3 times the measure of its supplement, $\angle B$, as depicted below. What is the degree measure of $\angle A$?



A. $112\frac{1}{2}°$

B. 120°

C. 135°

D. 150°

E. $157\frac{1}{2}°$

10. A weight lifter can lift 510 pounds. His goal is to improve by 20% during the next year. How many pounds does he want to be able to lift 1 year from now?

F. 512
G. 530
H. 602
J. 610
K. 612

11. If $x = 4$ and $y = 5$, what is the value of

$$\frac{x^2(y^2 - 2)(x - y)}{x(y - x)}$$?

A. 92
B. −70
C. −92
D. −100
E. −368

12. If a bag contains 5 blue marbles, 4 red marbles, and 3 green marbles, what is the probability that a marble randomly picked from the bag will be red?

F. $\frac{1}{12}$

G. $\frac{1}{4}$

H. $\frac{1}{3}$

J. $\frac{5}{12}$

K. $\frac{2}{3}$

13. What is the value of $\frac{2^2 - 1^4}{3^2 - 1^5}$?

A. 0

B. $\frac{3}{10}$

C. $\frac{3}{8}$

D. $\frac{1}{2}$

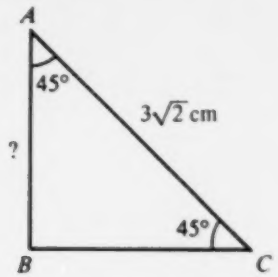
E. $\frac{5}{8}$

14. If $m = 4$, $n = -3$, and $p = 2$, what is the value of

$$\frac{mp - mn}{p^3}$$?

F. −0.50
G. −0.25
H. 0.40
J. 1.25
K. 2.50

15. In ΔABC below, the measures of $\angle A$ and $\angle C$ are each 45°, and $\overline{AC}$ is $3\sqrt{2}$ centimeters (cm) long. How long, in centimeters, is $\overline{AB}$?



A. 1
B. 3
C. $\sqrt{2}$
D. $\sqrt{6}$
E. $\frac{3\sqrt{2}}{2}$

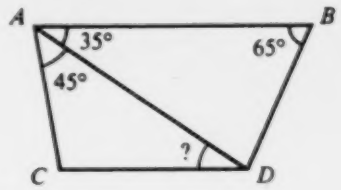
16. For all x and y, what is the sum of $2x^2y - 3xy^2$ and $-3x^2y + 2xy^2$?

F. $x^2y + xy^2$
G. $x^2y - xy^2$
H. $-x^2y - xy^2$
J. $-x^2y + xy^2$
K. $-x^4y^2 - x^2y^4$

17. What is the area, in square inches, of a triangle with a height of 3 inches and a base 1 inch long?

A. $\frac{3}{2}$
B. $\sqrt{3}$
C. 3
D. 4
E. 6

18. In the figure below, $\overline{AB}$ is parallel to $\overline{CD}$. What is the measure of $\angle ADC$?



F. 35°
G. 40°
H. 45°
J. 65°
K. 80°

19. If $kx + k = 0$, and $k > 1$, then $x = ?$

A. 0
B. -1
C. 1
D. $-k$
E. k

20. "Snake-eyes" occur when you roll two 1's on a pair of regular, 6-sided dice numbered from 1 to 6. On any roll, what is the probability of rolling snake-eyes?

F. $\frac{1}{36}$
G. $\frac{1}{25}$
H. $\frac{1}{18}$
J. $\frac{1}{6}$
K. $\frac{1}{3}$

21. Which of the following is a simplified form of $3x - (3 - x) + 1$?

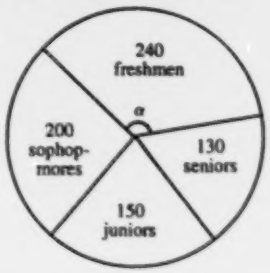
A. $2x - 2$
B. $2x + 2$
C. $2x + 4$
D. $4x - 2$
E. $4x + 4$

22. If $|2x - 2| = 4$, which of the following is a possible value for x?

F. -2
G. -1
H. 0
J. 1
K. 2

23. Lola is making the circle graph below showing the number of students at each grade level in her high school. What should be the measure of $\angle\alpha$?

A. 99°
B. 120°
C. 133°
D. 167°
E. 240°



24. What point on the graph of $x^2 + y = 7$ has an x-coordinate of -2 ?

F. $(-2, \sqrt{3})$
G. (-2, 3)
H. (-2, 5)
J. (-2, 9)
K. (-2,11)

25. What is the slope-intercept form of the equation $6x - 3y = 7$?

A. $y = 2x - 7$
B. $y = 2x - \frac{7}{3}$
C. $y = 2x - \frac{3}{7}$
D. $y = 2x + \frac{7}{3}$
E. $y = 2x + 7$

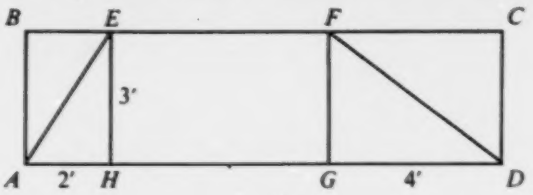
26. A line segment with length of $5\frac{1}{2}$ units is located on a number line with 1 endpoint fixed at coordinate $-3\frac{1}{2}$. What are the 2 possible coordinate locations of the other endpoint?

F. 9 and -2
G. 9 and -9
H. 2 and -8
J. 2 and -9
K. 2 and 9

27. At a certain store, all radios are discounted to 15% less than the radio's regular price. A customer brings a radio marked with a regular price of $120 to the checkout counter. If a sales tax of 5% of the purchase price is added (rounded to the nearest cent), how much money does the customer owe?

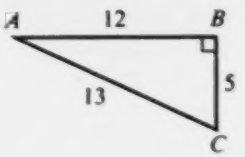
A. $102.90
B. $107.10
C. $108.00
D. $110.00
E. $110.25

28. Distances marked on the figure below are in feet. Points B, E, F, and C are collinear as are points A, H, G, and D. If the area of rectangle $ABCD$ is 33 square feet and $\overline{EH}$ and $\overline{FG}$ are each perpendicular to $\overline{AD}$, what is the area, in square feet, of trapezoid $AEFD$?



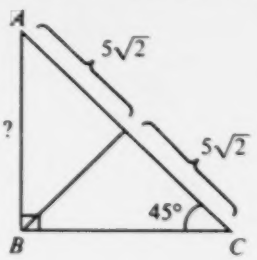
F. 15
G. 21
H. 24
J. 27
K. 48

29. In right triangle ΔABC below, what is the value of $\sin A$?



A. $\frac{5}{13}$
B. $\frac{12}{13}$
C. $\frac{13}{12}$
D. $\frac{12}{5}$
E. $\frac{13}{5}$

30. In right triangle ΔABC below, distances are shown in meters. How many meters long is $\overline{AB}$?

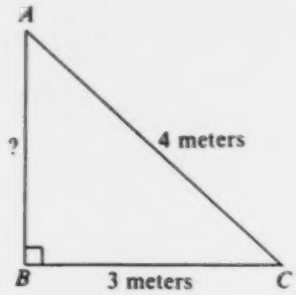


F. 10
G. $5\sqrt{2}$
H. 5
J. $\frac{5\sqrt{2}}{4}$
K. $\sqrt{2}$

31. On Family Day, attendance at the baseball game set a record. A reporter for the local paper asked how many adults had paid to see the game. The box office reported that exactly 450 tickets had been sold, and $2,000 was collected. If adults' tickets were $5 and children's tickets were $3, how many adults' tickets were sold?

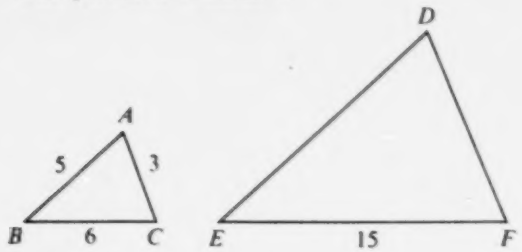
A. 75
B. 125
C. 325
D. 375
E. 400

32. In the right triangle below, how many meters long is $\overline{AB}$?



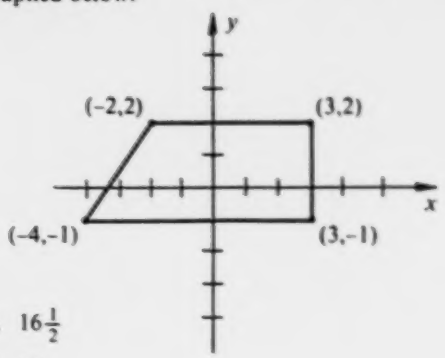
F. 12
G. 7
H. 5
J. 3
K. $\sqrt{7}$

33. The 2 triangles below are similar, with $\angle A \cong \angle D$. What is the perimeter of ΔDEF?



A. 14
B. 21
C. 29
D. 35
E. 41

34. What is the area, in square units, of the trapezoid graphed below?



F. $16\frac{1}{2}$
G. 18
H. 24
J. 27
K. 33

35. When graphed in the (x,y) coordinate plane, what is the slope of the line $\frac{y}{2} = x$?

A. -2
B. $-\frac{1}{2}$
C. $\frac{1}{2}$
D. 1
E. 2

36. Three-ring notebooks are made in 2 steps. Machine A makes 180 covers per hour. Later, Machine B attaches the 3-ring paper holder and completes 150 notebooks per hour. How many hours should Machine A run in order to produce the right number of covers for Machine B to finish in exactly 8 hours of its operation?

F. 5
G. $5\frac{1}{3}$
H. 6
J. $6\frac{2}{5}$
K. $6\frac{2}{3}$

37. If the triangles in the figure below are similar, then α = ?

A. 38°
B. 46°
C. 50°
D. 65°
E. 84°

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38. Which of the following equations is graphed below?

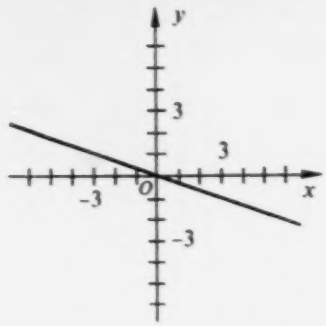
F. $y = -3x$

G. $y = -\frac{1}{3}x$

H. $y = \frac{1}{3}x$

J. $y = 3x$

K. $y = x - 3$



39. What is the radius, in meters, of a circle if its circumference is 36π meters?

A. 6
B. 12
C. 18
D. 36
E. 72

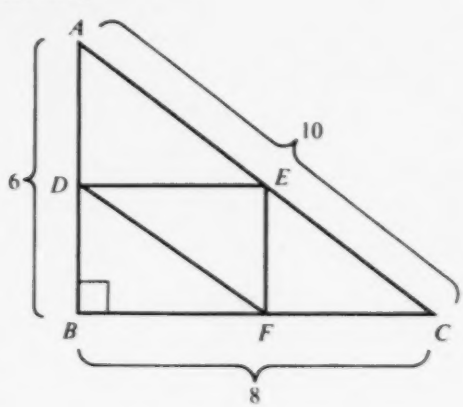
40. Whenever x and z are nonzero numbers,

$\left(\frac{x^{-2}}{z}\right)(x^2z^2)$ simplifies to:

F. $x^{-4}z^2$
G. $x^{-4}z$
H. $x^{-4}z^{-1}$
J. z^2
K. z

41. In right triangle ΔABC below, $AB = 6$, $BC = 8$, and $AC = 10$. Triangle ΔDEF was formed by connecting the midpoints of the sides of ΔABC. What is the area of ΔDEF, in square units?

(Note: The notation AB represents the length of the line segment $\overline{AB}$.)



A. 6
B. 10
C. 12
D. 18
E. 24

42. Three times a year a camera shop has a sale on packages of batteries: in February packages are 3 for \$4.49, in April they are 5 for \$7.39, and in December they are 4 for \$5.88. In which ordered sequence of months does the price per package go from smallest to middle to largest?

F. February, December, April
G. April, February, December
H. April, December, February
J. December, February, April
K. December, April, February

43. The trinomial $x^2 - x - 6$ can be factored as the product of 2 linear factors, in the form $(x + a)(x + b)$. What is the polynomial sum of these 2 factors?

A. $2x - 1$
B. $2x + 1$
C. $2x - 5$
D. $2x + 5$
E. $2x - 6$

44. A rectangular field is twice as long as it is wide, and has an area of 288 square meters. How many meters long is it?

F. 12
G. 24
H. 36
J. 72
K. 144

45. If $3ax + \frac{5r}{s} = 3ay$, then $x - y = ?$

A. $\frac{5r}{s} - 3a$

B. $\frac{-5r}{3as}$

C. $\frac{-5r}{6as}$

D. $\frac{-5r}{9a^2s}$

E. $\frac{-10r}{3a^2s}$

46. If the total surface area, A, of a cylinder (including its ends) is given by the formula $A = 2\pi r^2 + 2\pi rh$, which of the following expresses h in terms of A and r?

F. $h = \frac{A}{2\pi r^2}$

G. $h = 2\pi rA - r$

H. $h = \frac{A}{2\pi r + r}$

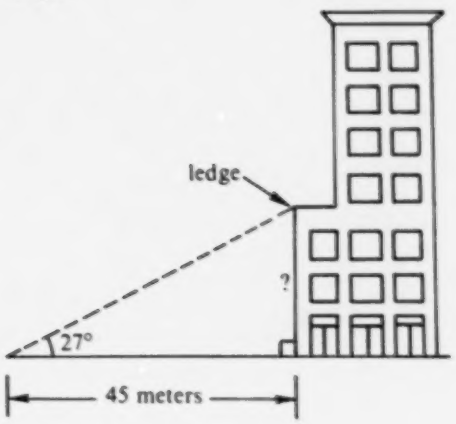
J. $h = \frac{A + 2\pi r}{2\pi}$

K. $h = \frac{A - 2\pi r^2}{2\pi r}$

47. If $\frac{x}{6} + \frac{x}{4} = \frac{1}{2}$, then x = ?

A. $\frac{1}{20}$
B. $\frac{1}{10}$
C. $\frac{1}{5}$
D. $\frac{6}{5}$
E. 5

48. From a point on the ground the angle of elevation to a ledge on a building is 27°, and the distance to the base of the building is 45 meters. How many meters high is the ledge?



F. $\frac{45}{\sin 27°}$
G. $\frac{45}{\tan 27°}$
H. $45 \sin 27°$
J. $45 \cos 27°$
K. $45 \tan 27°$

49. In the standard (x,y) coordinate plane there is only one circle centered at the point $(-1,4)$ that also passes through the point $(7,-2)$. Which of the following is an equation for that circle?

A. $(x+1)^2 + (y-4)^2 = 10$
B. $(x+1)^2 + (y-4)^2 = 100$
C. $(x-1)^2 + (y+4)^2 = 100$
D. $(x-4)^2 + (y+1)^2 = 100$
E. $(x-4)^2 + (y+1)^2 = 10$

50. If a is any real number, for what real value(s) of b does the equation $|x + a| = b$ have NO solutions for x ?

F. All $b < 0$
G. Only $b = -1$
H. Only $b = 0$
J. All $b \neq 0$
K. All $b > 0$

51. Which of the following is closest to 5×10^4 ?

A. 1,000
B. 5,000
C. 100,000
D. 500,000
E. 6,250,000

52. Which of the following is equivalent to $\frac{1 - \cos^2\theta}{\cos^2\theta}$?

F. $\sec^2\theta$
G. $(\csc^2\theta) - 1$
H. $\tan^2\theta$
J. $\sin^2\theta$
K. $-\frac{1}{\sin^2\theta}$

53. To work properly, an engine part's diameter cannot be over the specified diameter of 3 centimeters by more than .05 centimeters, nor can it be under the specified diameter by more than .05 centimeters. If x is the diameter of a part, which of the following algebraic statements specifies these restrictions on x ?

A. $x - 3 \geq .05$
B. $3 - x \geq .05$
C. $|x - .05| \leq 3$
D. $|3 - x| \leq .05$
E. $|x| \leq .05$

54. For all $a \neq 0$, what is the slope of the line segment connecting (a,b) and $(-a,b)$ in the usual (x,y) coordinate plane?

F. 0
G. $\frac{a}{b}$
H. $-\frac{b}{a}$
J. $\frac{b}{a}$
K. $2a$

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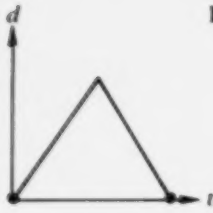
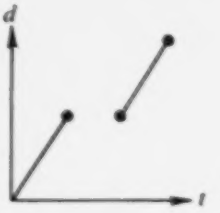
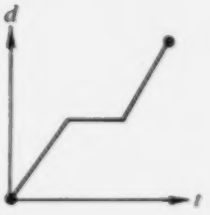
55. Starting at her doorstep, Ramona walked down the sidewalk at 1.5 feet per second for 4 seconds. Then she stopped for 4 seconds, realizing that she had forgotten something. Next she returned to her doorstep along the same route at 1.5 feet per second. The graph of Ramona's distance (d) from her doorstep as a function of time (t) would most resemble which of the following?

A.

D.

B.


E.


C.


56. For the quadratic equation $2x^2 + 5x + R = 0$, what value of R will make the solutions for x be $\frac{1}{2}$ and -3 ?

F. 27

G. 3

H. 2

J. $-\frac{3}{2}$

K. -3

57. If A is the measure of an acute angle (that is, $0° < A < 90°$) and $\sin A = \frac{12}{13}$, what are the possible values of $\tan A$?

A. $\frac{5}{12}$ and $-\frac{5}{12}$

B. $\frac{12}{5}$ and $-\frac{12}{5}$

C. $\frac{5}{12}$ only

D. $\frac{12}{5}$ only

E. $\frac{13}{12}$ only

58. If $\sqrt{(3 + \sqrt{x})} = 1 + \sqrt{2}$, then $x = ?$

F. 0
G. 2
H. 4
J. 8
K. 10

59. If $f(x) = 3x^3 - 27x$, which of the following correctly describes the zeros of the polynomial?

(Note: *Zeros* are values of x where $f(x) = 0$)

A. No real zeros
B. Only 1 rational zero
C. Only 1 real zero, which is irrational
D. 1 number is a double zero
E. 3 different rational zeros

60. Given 9 points, NO 3 of which lie on the same straight line, what is the maximum number of straight lines that can be drawn through pairs of those 9 points?

F. 8
G. 9
H. 27
J. 36
K. 72

END OF TEST 2

STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

DO NOT RETURN TO THE PREVIOUS TEST.

READING TEST

35 Minutes—40 Questions

DIRECTIONS: There are four passages in this test. Each passage is followed by several questions. After reading a passage, choose the best answer to each question and fill in the corresponding oval on your answer document. You may refer to the passages as often as necessary.

Passage I

PROSE FICTION: This passage is adapted from the novel *Rich in Love* by Josephine Humphreys (©1987 by Josephine Humphreys). In this selection, after finding an old Halloween costume, the narrator is confronted with past memories.

Rummaging in my mother's closet on Halloween, I found what I was looking for, in a plastic clothes bag jam-packed with folded woolens we would never wear again: there was the tell-tale striped fur, sticking out from under a mohair scarf. Memories hit me; I grabbed a corner of the fur and pulled. Mothballs scattered across the floor like beads of poisoned white ice, releasing their sad futile smell. I had carefully packed these things away—cardigans and pullovers of bygone cold seasons, out-of-fashion Scottish kilts held in place by giant safety pins, feebly small gloves—and moth-balled them in case the day came when they might be needed. Mother had scoffed at the effort; but now I had been proved right. I needed her old Halloween costume.

I sat there on the floor trying to locate the tail, finally spotting it under Rae's old green crew neck. I bent the kinks out and gave it a smooth arc. The head was a problem. I couldn't find it anywhere, and doubted it had survived. It had been made from a paper bag; it had probably been thrown away. But I recalled its every feature, the large mad eyes, the smile, whiskers, ears; and I knew I could replicate it.

"Look here," I said to Rae. "Can you give me a hand?"

She was on the sofa in the next room, watching television. . . . She didn't answer.

"All the materials have been assembled," I said, standing by the dining table with my hands on my hips, fingertips towards my back in the posture of a kindergarten teacher. "Glue, scissors, paper, Magic Markers. First we have to locate the eye-holes. Can you come here for a sec and draw a spot where I put my finger?"

I put the bag over my head and pointed to where the eyes should be. "Right here, see? Just make two marks, here and here." I waited about a minute. A long time. It was hard to breathe in the bag, but the interior of it was a beautiful golden-red, and it smelled good. . . .

"The grin goes like a crescent moon flopped onto its back, wide, with lots and *lots* of teeth," I said, drawing the face in. I actually whistled briefly, a made-up tune that she, as a singer, would automatically recognize as a sham. "Gee," I said, shaking my head, "nobody enjoyed Halloween like Mother did. She loved it, didn't she?"

Rae turned her eyes in my direction, but her face was stone-cold, the skin above her cheekbones puffy.

"It's her cat costume," I said, holding up the suit and the tail. "I'm remaking the head. I have a good idea of what it looked like, but I'm a little worried about the ears. You wouldn't happen to remember how they were done, I don't guess."

She looked through me, and I was shamed by my own voice, that teacher's fake conviviality, the ruse of arts-and-crafts. Rae's eyes said, *You don't know anything*. She was sick. I knew that, I knew that. I ought to have called her doctor, but at the same time I was thinking everything would be okay soon. A few more weeks. . . . She would get her chemistry back and be her old self again.

For the last week, we had been literally tiptoeing through our rooms, afraid that any little creak or scrape would disturb her. . . . We brought her soft drinks, tea, magazines. I tried to think up activities besides television, anything that might pique her interest.

"This is how the whiskers went, I think. Cut long strips of paper—I'm just using a second paper bag here—and run the flat edge of the scissors down the strip to make it curl. Voilà. Then glue each whisker, like so, next to the nose, four on a side." She was watching. I glued quickly so I wouldn't lose her. Maybe I ought to be a kindergarten teacher. They have to be sneaky.

"For ears, let's try a small triangle cut from a double thickness and cupped, earlike. A flap bent at the bottom can be glued down to hold it on, for a perfectly adequate ear. Rabbity, maybe, but fine for a temporary cat, in my opinion."

"Excuse me," she said, getting up with difficulty.

"Oh, don't go, Rae." I dropped the bag onto the table. "I didn't mean to annoy you."

"Nothing annoys me," she said. "I feel bad."

"Do you want me to call Dr. Ellis?"

"What for? It's nothing serious. I must have eaten something that didn't agree with me."

"Well, he might be able to do something to make you feel better.". . .

"I don't think so," she said. "But thank you." It was the first time she had said anything polite to me in days.

1. According to the passage, the narrator finally located the cat costume's tail:
   - A. under an out-of-fashion Scottish kilt.
   - B. under Rae's old green crew neck.
   - C. under a mohair scarf.
   - D. beside a telltale striped fur.

2. The narrator claims that kindergarten teachers have to be:
   - F. compassionate.
   - G. tender.
   - H. patient.
   - J. sneaky.

3. According to the passage, the narrator cannot find the head to her mother's Halloween costume most probably because:
   - A. the costume never really had a head.
   - B. someone had already tossed it out.
   - C. she is looking in the wrong place.
   - D. Rae has taken it for her own use.

4. The majority of the items of clothing the narrator finds in her mother's closet (lines 1–14) have in common the fact that they are:
   - F. things the narrator uses often.
   - G. being saved for a particular future holiday.
   - H. costumes for different holidays.
   - J. unlikely to be used again.

5. One purpose lines 53–60 serve in relation to the passage as a whole is to suggest that:
   - A. the narrator is frequently convivial in a manner best described as insincere.
   - B. Rae's eyes are unusually expressive, especially when it comes to conveying her feelings about holidays.
   - C. the narrator is worried about Rae but hopes she'll get better on her own.
   - D. arts and crafts are something the narrator frequently concerns herself with.

6. As it is used in line 65, the phrase *pique her interest* most nearly means:
   - F. get her to care about something.
   - G. make her want to create a costume.
   - H. cause her to see something.
   - J. make her interesting.

7. According to the passage, the narrator's mother scoffed at the effort to preserve various folded woolens most probably because she felt that:
   - A. her daughter should use her time to create things.
   - B. those things would never again be needed.
   - C. those things would be needed soon, and thus should not be stored away.
   - D. having anything made from natural fur was immoral.

8. Given the information provided by the passage, Rae's manner might best be described as:
   - F. casual.
   - G. helpful.
   - H. optimistic.
   - J. subdued.

9. When the narrator of the passage says, "Memories hit me" (line 5), it seems most likely that she means that:
   - A. seeing the old clothes made her nostalgic.
   - B. she remembered her mother telling her to save the clothes.
   - C. her past holds much more promise than her future.
   - D. memories are often unpleasant and are best avoided.

10. One of the things we know about Rae from the passage is that she practices the art of:
    - F. costume design.
    - G. healing.
    - H. teaching.
    - J. singing.

Passage II

SOCIAL SCIENCE: This passage is adapted from Lewis Mumford's work *The Myth and the Machine: Technics and Human Development* (©1967 by Lewis Mumford). This passage notes the relationship between hunting and the development of imaginative art during the Paleolithic era.

Behind the fine craftsmanship and expressive art that characterized the last phases of Paleolithic culture was the mode of life brought about by specialization in hunting big game. In this pursuit a more cooperative strategy, requiring larger numbers of trackers, beaters, and killers, was required; and that presupposes a tribal or clan organization. Single family groups of less than fifty people, only a minority being adult males, could hardly have done the job. That Ice Age hunting life was necessarily dependent upon the movement of the great herds in search of fresh grazing or browsing grounds: yet it developed fixed points of reference and return. . . .

If curiosity, cunning, adaptability, inurement to repetition were—along with sociability—the prime virtues of early man, the later Paleolithic hunter needed still other traits: courage, imagination, adroitness, readiness to face the unexpected. At a critical moment in the hunt, when an enraged buffalo, already wounded, turned upon the hunters closing in upon him, the ability to act in concert at the command of the most experienced and daring hunter was the price of avoiding injury and sudden death. There was no parallel to this situation in food-gathering, nor yet in the later modes of Neolithic agriculture. . . .

Unlike food-gathering, be it noted, hunting carried with it an insidious danger to man's tenderer, parental, life-fostering nature: the necessity to kill as a recurrent occupation. The stone-pointed javelin or arrow, with its capacity to strike home at a distance as well as at close quarters, enlarged the range of killing and appears at first to have awakened anxious misgivings as to its effects. Even toward the cave-bears he expelled from their shelters and ate for food, Paleolithic man seems to have nourished a sacred fear, as with his later totemic animals. The skulls of these animals have been found arranged as if they were the objects of a cult. Like some hunting tribes to this day, Paleolithic hunters possibly begged the slain creatures' forgiveness, pleading hunger as justification, and limiting the kill to such food as was actually needed. . . .

The systematic killing of big game probably had still another effect upon Paleolithic man: he was confronted by the fact of death, not at infrequent intervals, but as an everyday accompaniment to life. To the extent that he may have identified himself with his victim, he was forced to take into consciousness his own death, too, and that of his family, his kinsmen, his fellow tribesmen.

Here, under the further incitements of dream, may lie the beginnings of man's devious efforts to prolong his life in the imagination, by assuming that the dead, though physically removed from the scene, are still in some sense alive, watching, intervening, prompting: sometimes benignly, as a source of wisdom and comfort; but in no small number of instances the spirits of the departed, haunting the dream life, are full of malice and must be exorcised, or propitiated, lest they bring on disaster. Perhaps the memorial arts of sculpture and painting, which flourished now for the first time, were deliberate attempts to outwit death. Life departs, but the image remains and continues to enhance other lives.

The greater part of Paleolithic art was preserved in caves; and in the case of some of the painted images and sculpture found there—about ten percent of the total number—we have reason to associate the art with magic rituals to invoke success in hunting. . . . If magic ritual was invoked by the hunter, it was because in the very performance of it he acquired both the insight and the skill necessary to carry out his task successfully. The kind of graphic line achieved in the paintings of the bisons of Altamira or the deer of Lascaux implies fine sensory-muscular coordination, along with the sharpest kind of eye for subtle detail. Hunting, as everyone who has hunted even in the most desultory way knows, requires a high degree of visual and aural alertness to the least quiver of movement in leaves or grass, along with hair-trigger readiness to react promptly. That the Magdalenian hunter had attained this state of sensory vividness and esthetic tension is shown, not merely by the evocative realism of his highly abstract representations, but by the fact that many of his animals are depicted in motion. . . .

All that we can say with any surety about this phase of human development is that hunting was a propitious medium for imaginative art. . . .

So while hunting in the grand style required daring muscular exploits and promoted a surgical hardness about inflicting pain and taking life, it was also accompanied by an increase in esthetic sensitiveness and emotional richness—preludes to further symbolic expression.

11. According to the passage, dreams incited:

A. efforts to improve hunting skills.
B. efforts to improve the graphic line used in drawing.
C. the invention of stone-pointed javelins and arrows.
D. assumptions that the dead are still, in some sense, alive.

12. According to the passage, what was the impact of stone-pointed javelins or arrows?

F. They enlarged the range of killing.
G. They allowed bigger game to be killed.
H. They made it possible for smaller groups to hunt big game.
J. They magnified the impact of the hunters' blows.

13. The author infers that late Paleolithic groups developed highly disciplined hunting practices from the knowledge that:

    A. the animals they hunted were scarce.
    B. they lived during the Ice Age, when food was scarce.
    C. the animals they hunted were dangerous.
    D. they competed with food gatherers for scarce resources.

14. The author mentions the movement of the great herds from place to place as an example of:

    F. something described in the cave paintings at Lascaux but not at Altamira.
    G. a factor that gave rise to the development of magic rituals.
    H. one reason for the development of stone-pointed javelins and arrows.
    J. a variable that shaped the mode of life of Paleolithic hunters.

15. What evidence in the passage is offered to support the claim that Paleolithic hunters were skillful?

    A. They lacked courage, imagination, adroitness, and readiness to face the unexpected.
    B. The art they left behind demanded the fine sensory-muscular coordination required for skillful hunting.
    C. The art they left behind reveals curiosity, cunning, adaptability, and inurement to repetition.
    D. Fine art, such as they left behind, is usually associated with skillful hunting societies.

16. The main idea of the first paragraph is that:

    F. the late Paleolithic mode of life was affected by the specialization required in big-game hunting.
    G. early Paleolithic hunters formed larger social groups than later food gatherers.
    H. only a minority of late Paleolithic hunters were adult males.
    J. the migrations of the great herds determined the late Paleolithic way of life.

17. One can infer from the passage that the author describes painting and sculpture as "memorial arts" (line 58) because they were meant to:

    A. remind Paleolithic hunters of Neolithic achievements.
    B. teach Paleolithic man of needed hunting techniques.
    C. circumvent death by preserving images of people who had died.
    D. remind Paleolithic hunters of earlier, food-gathering people.

18. According to the author, the mode of life brought about by specialization in hunting big game caused:

    I. Paleolithic hunters to be conscious of death.
    II. imaginative and well-executed painting and sculpture to be created.
    III. Paleolithic hunters to discard those virtues useful in earlier food gathering.

    F. I only
    G. I and II only
    H. II and III only
    J. I, II, and III

19. How does the passage distinguish Paleolithic hunters from earlier food gatherers?

    A. Paleolithic hunters were able to operate in smaller social groups.
    B. Paleolithic hunters were more likely to live in family groups of less than fifty people.
    C. Paleolithic hunters added new traits to those that earlier men had possessed.
    D. Paleolithic hunters were more virtuous than earlier men.

20. Is the following sentence (lines 36–40) treated in the passage as an established fact?

    Like some hunting tribes to this day, Paleolithic hunters possibly begged the slain creatures' forgiveness, pleading hunger as justification, and limiting the kill to such food as was actually needed.

    F. No, because it is a fact that the hunters described were inured to killing.
    G. No, because it is the author's inference from the positions in which the animals' skulls were found.
    H. No, because it is the author's inference from the fact that Paleolithic hunters never killed more than they ate.
    J. Yes, because it is a fact that some hunting tribes still ask the animals' forgiveness.

Passage III

HUMANITIES: This passage is adapted from *Women Poets of the World* by Rob Swigart (©1983 by Macmillan Publishing Co., Inc.). This passage explains how women from the Heian Period helped to shape Japanese literature.

Poetry begins in life and its necessities, but in order to flourish as a written art it requires leisure, the time to pursue and to perfect. The Heian Period (794–1185 A.D.) in Japan provided an abundance of that leisure and the desire to perfect a tradition which is unique in the histories of world literature.

The word *Heian* itself means "peace," "tranquillity." Culture—visual arts, literature, philosophy, music—was concentrated in Kyoto, where an elegant court gathered around the Emperor and his family. Outside of the capital there was little of interest to these perhaps two thousand people; enormous energy was concentrated in just a few square miles, an energy which could be devoted entirely to clothing, poetry, food, incense and intrigue. There were no wars, no invasions from outside this insulated and insular country, no popular uprisings to distract attention from the refinement of the senses. . . .

. . . Japanese was, during the entire Heian era, considered unsuited to the lofty thoughts of serious poetry, for which the Chinese language was reserved. Japanese would be used for occasional poems, love verses, the literature of seduction and lament. It was left to women to write in Japanese, in the vernacular, while men reserved the supposedly more difficult Chinese for themselves, unaware that what they were writing was imitation Chinese literature, inferior to the original, and, above all, inferior to what contemporary women were writing in their native tongue. . . . But in time it became apparent that all that once appeared trivial and marginal was in fact the outstanding achievement in Japanese literature, and one of the greatest achievements in all of world literature. Women produced the best, the greatest classics in Japanese: not simply *The Tale of Genji*, Murasaki's *Diary*, the *Pillow Book of Sei Shonagon*, but the poetry of Ono no Komachi, Ise, Otomo no Sakanoe and others. So important were women to the native literature that when men set their hands to writing poetic diaries, as Ki no Tsurayuki did in the *Tosa Diary*, they often wrote under the persona of a woman.

It is clear then that women occupied a strong position in Japan during the first centuries following the development of literacy, so long as the vernacular remained outside the realm of power and prestige. During these first five hundred years they created the themes, forms and moods which shaped subsequent Japanese literary tradition: the *tanka*, with its elegiac tone and characteristic imagery; the diary; and the novel.

Deeply embedded in the poems of [Japanese women] are feelings of regret about the shortness of life, the fickleness of love, and the ravages of age, which imbue them with a brooding melancholy. They rapidly became conventionalized and traditional, a sorrowful lament, perhaps, for the passing of desire as much as for the torment of it. These elegiac feelings, and a dark mysteriousness, are an essential part of the tradition, with special literary terms and meanings; they are no longer confined to women.

At the end of the Heian era, when political and military upheaval destroyed the leisurely culture in Kyoto, men, and martial virtues, took over the vernacular as well as official culture. Then poetry became something to occupy the rare moments of rest in a soldier's life, or in the lives of hermits, priests, or courtiers confined to the distant court far from important events.

The imitation of Chinese poetry became a secondary occupation even for men; women surrendered their pre-eminence in the vernacular literature, and finally, as in so many other cultures, nearly vanished from the anthologies. The tradition they had done so much to shape was carried on by men.

Not until the beginning of the twentieth century did women reappear as an important force in Japanese literature, despite the existence of one or two significant *haiku* poets, for example Chiyo, in the Tokugawa period. Some modern women poets, like Yosano Akiko, returned to traditional forms, *haiku* and *tanka* (which had fallen into disuse), and made use of traditional imagery, but expanded the range of feeling and experience to include more psychological and emotional complexity. Others, like Shiraishi Kazuko, have absorbed various manifestations of Western culture, from T. S. Eliot, Ezra Pound and other modern poets to jazz rhythms and cabaret songs. The swift industrialization of post–World War II Japan has produced changes in lifestyle and in the conditions of women; these changes have had a profound effect on their poetry.

21. The Heian period in Japan was known as a period of:

- **A.** international expansion.
- **B.** quiet leisure.
- **C.** political upheaval.
- **D.** cultural dormancy.

22. Which of the following phrases best describes the tanka form of Japanese poetry?

- **F.** A verse form inherited from Chinese sources
- **G.** An epic form exploring martial themes
- **H.** A form derived from the works of Eliot and Pound
- **J.** A traditional form elegiac in tone

23. According to the passage, the end of the Heian era was caused by:

- **A.** the leisurely culture.
- **B.** political and military upheavals.
- **C.** the dominance of martial virtues.
- **D.** a cultural revolution.

24. The first paragraph suggests a certain contradiction in the development of poetry: namely, that although the inspiration for poetry lies in the activities of life, its:

F. flourishing as a written art requires periods of leisure.
G. demise will be signaled by an abundance of leisure time.
H. perfection depends on a commitment to the past.
J. true success lies in the necessities of life.

25. This passage focuses primarily on which of the following?

A. The poets of modern Japan
B. The role of martial values in Japanese poetry
C. The role of women poets in Japanese literature
D. The changing nature of feminist poetry

26. Particular attention was paid to the Heian era in this passage primarily to illustrate which of the following?

F. The emergence of women as a force in Japanese literature
G. A typical cultural period in Japanese history
H. The dominance of Chinese thought on Japanese culture
J. The effect of military and political upheavals on culture

27. According to the passage, in the period between the Heian era and the twentieth century, Japanese women poets did all of the following EXCEPT:

A. surrender their prominence in the vernacular culture.
B. watch men carry on the traditions they had established.
C. disappear as an important force in Japanese literature.
D. take up the imitation of Chinese poetry.

28. According to the passage, a list of literary classics produced by Japanese women should include which of the following?

I. *The Tale of Genji*
II. The *Tosa Diary*
III. The *Pillow Book of Sei Shonagon*

F. II only
G. I and III only
H. II and III only
J. I, II, and III

29. As it is used throughout the passage, the word *vernacular* refers to:

A. a foreign language.
B. the official language of a court.
C. the language of an invading culture.
D. the native language.

30. The passage suggests that when Japanese women poets returned to the traditional forms after the beginning of the twentieth century, they revitalized those traditional forms by doing which of the following?

F. Expanding the range of feeling to include more psychological and emotional complexity
G. Turning once again to contemporary Chinese poetry for guidance in forms and moods
H. Purging various manifestations of Western culture that had crept into Japanese poetry
J. Tacking the rhythms of jazz and cabaret songs onto the traditional poetic forms

Passage IV

NATURAL SCIENCE: This passage is adapted from David Quammen's *Natural Acts: A Sidelong View of Science and Nature* (©1985 by David Quammen). In this selection, Quammen describes the unusual attributes of the sea cucumber.

Sea cucumbers are not vegetables. They only look and act that way. In fact they are marine animals of the echinoderm phylum, a primitive group that also includes starfish, sea urchins, and two other star-shaped members called the feather-stars and the brittle-stars. Echinoderms are distinct from almost all other animal groups in being radially, rather than bilaterally, symmetrical. In other words they know top from bottom but not front from back nor left side from right side. They all share a pentamerous anatomical organization, with most of their features occurring in fives: five axes of symmetry, five sets of each organ, five major arteries, and for those like the starfish and the brittle-stars, five legs. They have a mouth hidden under the belly, and an anus that generally marks the center of their back. The skin of an echinoderm is often described as "leathery" or "rubbery" but think instead of the texture of imperfectly cooked tripe. Imbedded in that skin are calcareous plates, in some cases quite small and with no interconnections, constituting a minimal skeleton. Echinoderms have been known to stay in one spot, without moving, for up to two years. They have never heard of eyes. They developed all these eccentric proclivities, back in the Cambrian period a half billion years ago, before any consensus arose as to how an animal is supposed to behave. But just as the echinoderms are exceptional among animals, so the sea cucumbers are exceptional among echinoderms.

They retain the five-sided symmetry on the inside but don't give much hint of it externally. Sometime in the dim past they grew so tall and top-heavy that they have tipped over permanently onto one flank. The radial symmetry is now 90 degrees off kilter. Consequently they *do* have a discernible front: the end with the mouth, around which have been added a ring of tentacles like the leaf ends of celery. . . . They shuffle across the sea bottom in worm-like fashion, by means of muscular contractions and elongations that roll down their soft bodies in waves. Moving deliberately, they swallow the rich benthic mixture of sand and muck, strain the organic debris from it in their long simple gut, and pass the sterile sand out behind. Theoretically at least, they glide along like an open pipe while the sand, rippling faintly as it is cleaned, remains stationary.

In sea cucumbers (again, uniquely among all echinoderms) the skeletal plates are reduced to microscopic size and come in delicate patterns like snowflakes, but serve who knows what use. In overall body shape, some species resemble Italian sausages, some are more faithful to their garden namesake, some display the distinguished profile of a balloon overfilled precariously with tapioca. They range from the size of a baby gherkin to the size of a huge zucchini, one of those monstrous country-fair winners that gets its photo sent out on the AP wire. They are variously decorated in swirls and mottles and stripes of lavender, orange, yellow, parakeet green. Truly these guys are out in left field.

But it bothers them not. In the deepest trenches of the ocean they carry on blithely and quite successfully, working a zone that few other animals are equipped to explore. Researchers on the ocean abyss have discovered that, at a depth of 13,000 feet, sea cucumbers account for half of all the living organisms. Down at 28,000 feet, the sea cucumber majority rises to 90 percent. And at the ocean's bottomest bottom, 33,000 feet down in the Philippine Trench, almost no living creatures are to be found—except sea cucumbers.

In shallower waters, like those coral formations off the west coast of Mexico, they also get along well. This is in part because sea cucumbers have few natural predators, owing presumably to the various nasty poisons contained in the mucous secretions of their skin. Additionally, some species have developed the useful trick of self-mutilation: If a lobster or an otter or a snoopy human lays hold of one of this group, the sea cucumber constricts itself drastically at certain points along the body, and breaks into several pieces. The predator, ideally, will be satisfied with a middle or a posterior section. All the sections are destined to die except the front end, with the mouth and tentacles. If this chunk is left in peace, from it will regenerate a new entire cucumber.

31. According to the passage, the sea cucumber's movement across the ocean floor is accomplished by means of:

    A. its five-sided symmetrical motions.
    B. muscular contractions and elongations.
    C. the wiggling of its tentacles.
    D. its bilateral radial symmetry.

32. According to the passage, which of the following species might bother a sea cucumber?

    I. Sea otter
    II. Starfish
    III. Lobster

    F. I only
    G. I and II only
    H. I and III only
    J. II and III only

33. According to the passage, when did the sea cucumber's behavioral patterns first evolve?

    A. Several billion years ago
    B. When they observed and imitated other echinoderms
    C. During the Cambrian period
    D. Before other echinoderms' behavioral patterns evolved

34. According to the passage, sea cucumbers have gotten off kilter because at some point in their development they grew:

F. too tall and top-heavy.
G. too round and long.
H. too flat on the bottom.
J. smaller skeletal plates.

35. It can reasonably be inferred from the author's comment "Truly these guys are out in left field" (lines 58–59) that he feels sea cucumbers are:

A. perhaps the most misunderstood sea animals ever known.
B. awfully strange and eccentric sea animals.
C. a species that lives far from other sea animals.
D. known to come in quite a range of sizes.

36. It can reasonably be inferred from the passage that, in order to eat, sea cucumbers must:

F. move slowly along the bottom of the sea.
G. flip onto their backs and move along the bottom of the sea.
H. move to their left and then their right along the bottom of the sea.
J. move their calcareous plates in a pentamerous fashion.

37. The main point of the fourth paragraph (lines 60–69) is that sea cucumbers:

A. account for the majority of undersea animals.
B. are studied often by researchers on the ocean abyss.
C. live successfully where few other sea animals can.
D. actually enjoy being different from other animals.

38. According to the passage, in terms of their appearance, sea cucumbers are:

F. about the same size but exhibit a variety of colors.
G. different sizes and are also variously decorated.
H. different sizes and are rarely striped lavender, orange, yellow, or parakeet green.
J. different sizes and are ringed in delicately patterned colors.

39. It can reasonably be inferred from the first paragraph that the author feels descriptions of echinoderms' skin as "leathery" and "rubbery" are:

A. evidence of the animals' minimal skeleton.
B. precise and accurate.
C. more characteristic of the feel of starfish.
D. almost but not exactly accurate.

40. According to the passage, the sea cucumber's pentamerous anatomical organization differs from that of a starfish in that it:

F. relies on delicate skeletal plate patterns.
G. is even more pronounced externally.
H. exhibits remarkable and inexplicable inconsistencies.
J. is not especially obvious externally.

END OF TEST 3

STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

DO NOT RETURN TO A PREVIOUS TEST.

SCIENCE REASONING TEST

35 Minutes—40 Questions

DIRECTIONS: There are seven passages in this test. Each passage is followed by several questions. After reading a passage, choose the best answer to each question and fill in the corresponding oval on your answer document. You may refer to the passages as often as necessary.

You are NOT permitted to use a calculator on this test.

Passage I

A geologist conducted three studies to evaluate the rate at which water enters and leaves a lake and its effect on lake volume. Water entering the lake is called *inflow* and water leaving is called *outflow*. The studies were conducted over a five-year period.

Study 1

The geologist measured two major sources of water inflow: rainfall and inflowing streams. Measurements of each were taken regularly over the five-year period. From these measurements, the geologist calculated that the annual averages totaled 260×10^6 cubic meters of water per year (m^3/yr). The results are in Table 1.

Table 1

Type of inflow	Average inflow (m^3/yr)
Inflowing streams	200×10^6
Rainfall on lake	60×10^6

Study 2

Water leaves the lake naturally by outflowing streams, evaporation, and infiltration into the rocks below the lake. Measurements of these three processes were taken regularly over the five-year period. In addition, a water company pumps water out of the lake to supply several communities. The water company gave the geologists measurements of the pumping rate during the investigation period. A total outflow of 300×10^6 m^3/yr was calculated. The average outflow for each process is in Table 2.

Table 2

Type of outflow	Average outflow (m^3/yr)
Outflowing streams	100×10^6
Evaporation	50×10^6
Infiltration	60×10^6
Pumping	90×10^6

Study 3

The geologist installed a water depth recorder at the center of the lake and took regular monthly readings during the five-year period. These readings were averaged each year. The lake level was found to be decreasing at an average rate of 10 cm per year.

1. If dams were constructed to effectively stop the escape of water by outflowing streams, which of the following is most likely?
   - A. Total outflow would equal total inflow.
   - B. Total outflow and lake volume would both probably increase.
   - C. Total outflow and lake volume would both probably decrease.
   - D. Total outflow would decrease and lake volume would increase.

2. If the area had experienced a lack of rainfall during the five-year study period, how would this have affected the results?
   - F. Total outflow would be higher.
   - G. Total inflow would be lower.
   - H. Infiltration would be higher.
   - J. All results would be unaffected by the drought.

3. Which of the following generalizations about the lake's water balance can be made based on the results of the studies?
   - A. For any lake, total water outflow always exceeds total water inflow.
   - B. The number of inflowing streams exceeds the number of outflowing streams.
   - C. If the rates of water entering and leaving a lake are not balanced, lake depth will change.
   - D. A lake cannot have both inflowing and outflowing streams and maintain a constant volume.

GO ON TO THE NEXT PAGE.

4. Would the geologist have obtained more accurate results if the investigation period was decreased from five to two years?

   F. Yes, because there would be less chance of human error in the measurements.
   G. Yes, because there would be fewer variables to consider.
   H. No, because abnormally high or low measurements would distort the averages.
   J. No, because water movement in and out of the lake is slow.

5. Which of the following assumptions was made in all three studies?

   A. The three studies were done at different five-year periods.
   B. The lake is underlain by rock that water cannot infiltrate.
   C. Total inflow and outflow were constant during the investigation.
   D. All significant inflows and outflows of water were identified.

6. Based on the results of the studies, the geologist concludes that lake volume decreased annually. Which of the following would help support that conclusion?

   F. Determining if rainfall rate increased annually
   G. Determining if the surface area of the lake decreased annually
   H. Repeating the same studies on a different lake
   J. Repeating the depth measurements on a different lake

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Passage II

Fossil footprints of dinosaurs can be used to identify the type, size, speed, and gait of these animals. Determination of *gait* (the manner of moving on foot) is based on comparisons with speeds at which modern animals walk and run. Geologists performed the following studies to help estimate this information for some ancient footprints.

Study 1

A 68-million-year-old fossil trackway was discovered in a rock formation that consisted of alternating layers of mudstone and sandstone. A *trackway* is a path or trail commonly used by groups of animals. In the top mudstone layer, five sets of tracks were exposed that belonged to several species of two-legged dinosaurs. The tracks were oriented in the same direction and were formed at approximately the same time. Geologists concluded that two sets were made by meat-eating dinosaurs and the other three sets by plant-eaters. Measurements of the foot length and *stride length* (distance between successive footprints) of each set of dinosaur tracks were taken at the trackway.

Study 2

A geologist measured the skeletons of meat-eating and plant-eating dinosaurs in a museum. Table 1 shows the leg length, foot length, and ratio of leg length to foot length for those museum specimens.

Table 1

Dinosaur	Leg length (m)	Foot length (m)	Ratio
Large meat-eater	3.25	0.78	4.2:1
Small meat-eater A	1.33	0.31	4.3:1
Small meat-eater B	0.69	0.17	4.1:1
Large plant-eater	2.46	0.68	3.6:1
Small plant-eater	0.44	0.12	3.7:1

Study 3

The leg length of the five dinosaurs from Study 1 was estimated using the data from Study 2. Their estimated speed was then calculated from modern animals that have stride-length-to-leg-length ratios similar to those of dinosaurs. Table 2 shows the calculated leg length, calculated speed, and gait of the dinosaurs.

Table 2

Dinosaur	Leg length (m)	Speed (m/sec)	Gait
Meat-eater 1	2.60	2.0	walk
Meat-eater 2	0.22	3.5	run
Plant-eater 1	1.60	4.8	run
Plant-eater 2	0.14	4.3	run
Plant-eater 3	0.13	3.0	run

7. A geologist hypothesized that speed is related to the cold- or warm-bloodedness of an animal and that warm-blooded animals usually move at higher speeds. If this is true and some dinosaurs were known to be warm-blooded, which dinosaur in Study 3 was most likely warm-blooded?
   - A. Meat-eater 1
   - B. Meat-eater 2
   - C. Plant-eater 1
   - D. Plant-eater 3

8. Based on the information provided by the three studies, one can make the generalization that if:
   - F. speed is known, the type of dinosaur can be determined.
   - G. stride length and leg length are known, a dinosaur's speed can be estimated.
   - H. leg-length-to-foot-length ratio is known, the weight of the dinosaur can be calculated.
   - J. the type of food a dinosaur ate is known, its gait can be determined.

9. The information gathered in Study 2 was necessary because it:
   - A. showed the exact species of the dinosaurs in Study 1.
   - B. allowed the geologist to estimate the speed of the dinosaurs in Study 3.
   - C. determined the age of the fossil trackway discovered in Study 1.
   - D. helped to identify the rock types in the formation of Study 1.

10. A fossil trackway is found in an exposed sandstone layer that is less than 20 million years old. The tracks belong to a large flightless bird. Would Studies 1, 2, and 3 need to be modified to estimate the speed of this bird?
    - F. Yes, because measurements should be done on museum skeletons of fossil flightless birds.
    - G. Yes, because Study 1 used more than one set of tracks.
    - H. No, because birds are thought to be the ancestors of dinosaurs.
    - J. No, because the bird would have a speed that falls within the range of those of the dinosaurs in Table 2.

11. Another section of the trackway, 100 m farther down the path from the first site, is discovered. All five sets of tracks can be seen and are measured as in Study 1. It is found that Meat-eater 1 now has a speed of 4.6 m/sec, while the other speeds stayed the same. Which of the following conclusions is NOT consistent with the new data?

    A. Meat-eater 1 has changed gaits from walking to running.
    B. Meat-eater 1 will overtake the other four dinosaurs.
    C. Plant-eater 1 is in the least danger of being overtaken by Meat-eater 1.
    D. Plant-eater 3 is in the most danger of being overtaken by Meat-eater 1.

12. Which of the following alterations to the method of Study 2 would have made the results of Study 3 more accurate?

    F. Measuring the skeletons of dinosaurs that belong to species of dinosaurs other than those in Study 1
    G. Measuring the skeletons of more specimens of the same species as those in Study 1
    H. Measuring only the foot length of modern animals of various types
    J. Measuring the foot length of the small front feet of two-legged dinosaurs

Passage III

Tables 1 and 2 summarize information about the resistance of some 1-meter (m)-long aluminum and copper wires, respectively, that have different diameters. The resistance of a wire (reported in ohms) restricts the flow of electrons through the wire and results in the conversion of electrical energy to heat. Table 3 reports the resistance, in ohms, of different lengths of 0.10-mm-diameter aluminum wire at 20° C.

Table 1

Diameter of aluminum wires (mm)	Resistance (ohms) at:		
	0° C	20° C	50° C
0.08	5.20	5.64	6.31
0.10	3.27	3.55	3.97
0.16	1.29	1.40	1.57
0.20	0.81	0.88	0.99

Table 2

Diameter of copper wires (mm)	Resistance (ohms) at:		
	0° C	20° C	50° C
0.08	3.17	3.44	3.85
0.10	1.99	2.16	2.42
0.16	0.79	0.86	0.96
0.20	0.50	0.54	0.60

Table 3

Length of 0.10-mm-diameter aluminum wire (m)	Resistance (ohms) at 20° C
1	3.55
2	7.10
4	14.20
10	35.50

13. To determine if metal type affects resistance, the resistance of a copper wire with a diameter of 0.16 mm at a temperature of 0° C should be compared to the resistance of:
    - A. an aluminum wire with a diameter of 0.16 mm at 0° C.
    - B. an aluminum wire with a diameter of 0.16 mm at 20° C.
    - C. a copper wire with a diameter of 0.08 mm at 0° C.
    - D. a copper wire with a diameter of 0.16 mm at 20° C.

14. Based on the information in Table 3, one would predict that a 20-m length of aluminum wire with a 0.10-mm diameter would have a resistance of:
    - F. 16 ohms.
    - G. 25 ohms.
    - H. 34 ohms.
    - J. 71 ohms.

15. Could an experimenter calculate the *density* (mass/volume) of aluminum from a single table provided in the passage?
    - A. No, because the mass of only the aluminum wire is known.
    - B. No, because the mass is not given for any of the wires.
    - C. Yes, because both the mass and the volume of each wire can be calculated.
    - D. Yes, because the density is already given in the tables.

16. According to the data in Tables 1 and 2, which of the following sets of conditions would lead to the lowest resistance through 1 m of wire?
    - F. Aluminum wire, small diameter, high temperature
    - G. Copper wire, small diameter, low temperature
    - H. Copper wire, large diameter, low temperature
    - J. Copper wire, large diameter, high temperature

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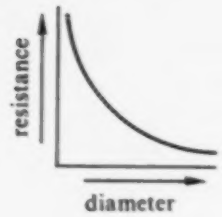
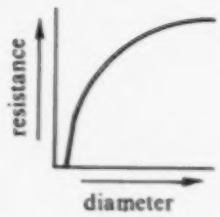
17. Which of the following graphs best represents the relationship between diameter and resistance for wires made of aluminum?

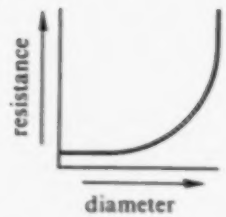
A.



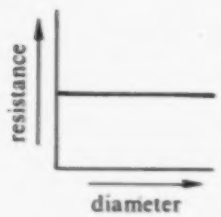
B.



C.



D.



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Passage IV

Barium (Ba), calcium (Ca), magnesium (Mg), and strontium (Sr) exist in their compounds as M^{2+} ions (Mg^{2+}, Ca^{2+}, etc.). When solutions of these ions are mixed with solutions containing X^{2-} ions (SO_4^{2-} [sulfate], CO_3^{2-} [carbonate], etc.), salts will *precipitate* (form a solid) if the combination of positive and negative ions forms an *insoluble* (not dissolving in solution) salt, MX:

$$M^{2+}\text{ (solution)} + X^{2-}\text{ (solution)} \rightarrow MX\text{ (solid)}$$

The following table summarizes the results of combining various metal nitrate solutions of equal concentrations with various solutions containing X^{2-} ions.

	Barium nitrate	Calcium nitrate	Magnesium nitrate	Strontium nitrate
Sulfuric acid (H_2SO_4)	white precipitate	no reaction	no reaction	white precipitate
Sodium carbonate (Na_2CO_3)	white precipitate	white precipitate	white precipitate	white precipitate
Ammonium oxalate [$(NH_4)_2C_2O_4$]	white precipitate	white precipitate	no reaction	white precipitate
Potassium chromate (K_2CrO_4 in acid)	yellow precipitate	no reaction	no reaction	no reaction

18. The addition of sulfuric acid to calcium nitrate results in "no reaction." In terms of what the chemist observes in the reaction beaker, "no reaction" takes place when:

F. a white solid forms.
G. a yellow solid forms.
H. the solution changes color.
J. no solid forms and the solution does not change color.

19. An unknown solution containing salts of two of the four elements barium, calcium, magnesium, and strontium gives no reaction with sulfuric acid. Based on the table, the unknown solution probably contains:

A. barium and calcium ions.
B. barium and strontium ions.
C. calcium and magnesium ions.
D. magnesium and strontium ions.

20. A student was given a solution that contained only one metallic ion, which was either Sr^{2+} or Ca^{2+}. The student was told to run one test with only one *reagent* (a substance used to identify or produce other substances) to identify the ion. Which one of the following reagents should the student use to correctly identify the ion?

F. Sulfuric acid
G. Sodium carbonate
H. Ammonium oxalate
J. Potassium chromate

21. Based on the table, which of the following experimental results confirms that an unknown solution contains magnesium nitrate ions only?

A. No reaction in sulfuric acid
B. No reaction in sulfuric acid followed by no reaction in potassium chromate solution
C. No reaction in potassium chromate followed by a white precipitate in sodium carbonate solution
D. No reaction in ammonium oxalate followed by a white precipitate in sodium carbonate solution

22. A solution contains a mixture of equal concentrations of barium, calcium, magnesium, and strontium ions. The procedure that would best separate the ions by precipitation (followed by filtration) would be to add X^{2-} ion solutions in which of the following orders?

F. Sulfate, chromate, carbonate, oxalate
G. Carbonate, sulfate, oxalate, chromate
H. Oxalate, sulfate, carbonate, chromate
J. Chromate, sulfate, oxalate, carbonate

Passage V

A pendulum is made by suspending a mass by a thin wire from a fixed support (see Figure 1 below). If the mass is pulled out such that the wire is at some small angle from the vertical direction and released, the mass will *oscillate* (swing back and forth between the position at which it was released and a position opposite that at which it was released). The time required for one such oscillation (over and back) is the *period* of the pendulum. The purpose of the following experiments is to determine how particular physical variables affect the measured period of a pendulum.

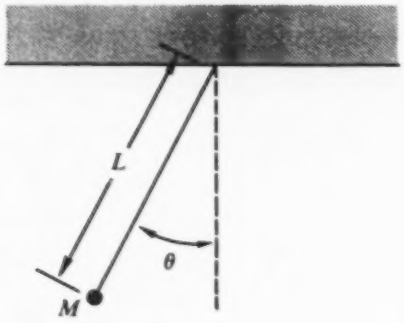


Figure 1

Experiment 1

The experimenter used three objects of different mass as pendulum weights. The wire length and the angle of initial displacement are held constant. The results of this experiment are presented in Table 1.

Table 1

Mass (kg)	Period (sec)
0.50	1.40
1.00	1.39
2.00	1.41

Experiment 2

The experimenter used three different lengths of wire to suspend the mass. The amount of mass suspended and the angle of initial displacement are held constant. The results are presented in Table 2.

Table 2

Length (m)	Period (sec)
0.50	1.40
1.00	1.98
2.00	2.81

Experiment 3

The experimenter varied the angle of initial displacement. The length of wire and the amount of mass suspended are held constant. The results are presented in Table 3.

Table 3

Angle	Period (sec)
2°	1.41
3°	1.39
4°	1.40

Experiment 4

The experimenter used the same procedure to measure the period of a single pendulum three times in a row without changing any of the variables. This is to determine the precision with which this experimental procedure can determine the period of a pendulum. The results are presented in Table 4.

Table 4

Trial	Period (sec)
1	1.98
2	1.97
3	1.99

23. A 4-kg mass is suspended from a string with a length of 0.5 m and released from an initial displacement angle of 2°. Which of the following is the best estimate for the resulting period of this pendulum?

A. 0.35 sec
B. 0.70 sec
C. 1.40 sec
D. 2.82 sec

24. A student is asked to estimate the length of wire used in Experiment 3. Based on the results of all the experiments, the student correctly concludes that the length of the wire used in Experiment 3:

F. is about 0.5 m.
G. is about 1.0 m.
H. is about 2.0 m.
J. cannot be determined with the data available.

25. Which of the following variables was(were) *directly* controlled by the experimenter in at least one of the experiments?

I. The amount of mass suspended
II. The period of oscillation
III. The length of wire
IV. The initial displacement angle

A. II only
B. I, II, and III only
C. I, II, and IV only
D. I, III, and IV only

26. In the preceding experiments the period of a pendulum was determined by measuring the time required for the pendulum to complete 50 oscillations and dividing that time by 50 to obtain the period. What experimental advantage is gained by timing 50 oscillations as opposed to timing a single oscillation?

F. The effect of air resistance is maximized.
G. The effect of air resistance is minimized.
H. Systematic errors in timing are reduced.
J. The longer one counts, the more lasting the results produced.

27. On the basis of all the experiments, one could conclude that the period of a pendulum is NOT affected by which of the following variables?

I. Amount of mass suspended
II. Length of wire used
III. Angle of initial displacement

A. III only
B. I and II only
C. II and III only
D. I and III only

28. Four pendulums, consisting of the following masses suspended from the corresponding lengths of wire, are released from the angles listed. Which of the following listed below will display the most similar periods of oscillation?

I. M = 3 kg, L = 2 m, released at 2°
II. M = 9 kg, L = 2 m, released at 3°
III. M = 3 kg, L = 4 m, released at 3°
IV. M = 3 kg, L = 3 m, released at 3°

F. I and II only
G. I and IV only
H. II and III only
J. III and IV only

Passage VI

Most plants require specific substances known as minerals to grow and reproduce. The following table provides a list of the minerals essential to flowering plants and a description of their functions. The first seven listed are called *macronutrients*, since they are present in large quantities in the plants. The other minerals are called *micronutrients* because they are often present in trace amounts. The number of pounds of each mineral required to grow 100 bushels of corn is also depicted in the table.

Element	Amount needed to grow 100 bushels of corn (lbs)	Function
Macronutrients:		
Calcium	50	Influences permeability of membranes; component of pectic salts in middle lamellae and necessary for cell wall formation; activator for several enzymes
Iron	2	Activation of porphyrins to form hemes which are contained in cytochromes, peroxidases, catalases, and some other enzymes
Magnesium	50	Structural component of chlorophyll; cofactor for many enzymes involved in carbohydrate metabolism
Nitrogen	160	Structural component of amino acids, nucleic acids, many hormones and coenzymes, etc.
Potassium	125	Essential to a vast number of plant functions, but its exact role is not well understood
Phosphorus	40	Structural component of nucleic acids, phospholipids, ATP, coenzymes, etc.
Sulfur	75	Structural component of some amino acids, vitamins, and enzymes, etc.
Micronutrients:		
Boron	0.06	Function unknown; may play a role in translocation of sugar; perhaps necessary for utilization of calcium in cell wall formation
Copper	Trace	Structural component of many enzymes that catalyze oxidation reactions
Chlorine	0.06	Function unknown
Manganese	0.3	Cofactor for many enzymes involved in cellular respiration, photosynthesis, and nitrogen metabolism
Molybdenum	Trace	Structural component of the enzyme that reduces nitrate to nitrite; essential for fixation of nitrogen and nitrogen-fixing bacteria
Sodium	0.06	Function unknown
Zinc	Trace	Necessary for synthesis of tryptophan (a precursor of auxin); component of the enzyme that catalyzes the decomposition of carbonic acid to CO_2 and H_2O; may be a cofactor for some enzymes involved in the oxidation of carbohydrates

Table adapted from William T. Keeton, *Biological Science*. © 1980 by W. W. Norton & Company.

29. According to the information presented in the table, flowering plants require iron in order to:

A. fix nitrogen.
B. activate porphyrins.
C. utilize calcium.
D. synthesize chlorophyll.

30. A scientist hypothesized that some minerals are required in minute quantities and are used as components of enzymes by flowering plants. The data for which of the following minerals would support this hypothesis?

F. Calcium
G. Phosphorus
H. Sodium
J. Zinc

31. A botanist in South America found a new variety of corn identical to the type described in the table with the exception that it utilizes copper, instead of iron, in activating porphyrins. Approximately how many pounds of copper would you predict would be required to grow 100 bushels of this new corn?

A. 0.3 lb
B. 2.0 lb
C. 4.0 lb
D. 50.0 lb

32. Which of the following conclusions about the mineral requirements of flowering plants is consistent with the data presented in the table?

F. Plants require larger amounts of minerals than are available in the soil.
G. Plants require some minerals whose functions remain unknown.
H. Deficiencies of certain minerals have little, if any, effect on plant growth.
J. The addition of minerals to the soil in the form of fertilizer results in a smaller yield of corn.

33. A researcher using the table concluded that minerals used as components of enzymes and as cofactors for enzymes are required in very small amounts. This is supported by the information given for all of the following elements EXCEPT:

A. magnesium.
B. manganese.
C. molybdenum.
D. zinc.

Passage VII

Rock layers containing fossils (remains of past life) can give clues to the past. Those fossils in older (lower) layers can be compared to those in younger (higher) layers. This comparison often shows that life forms have changed over a period of time. Scientists who study fossils hypothesize that those changes occurred as a result of *evolution*. Evolution theory suggests that more recent forms have their origin in earlier forms and that the differences between them are due to changes in successive generations, resulting in new species. Two mechanisms have been proposed to explain how these changes occur over time.

Gradualism

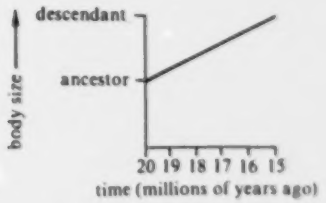
This theory says the changes occur slowly, steadily, and gradually, in response to environmental changes. The entire species is transformed over millions of years into a new species by accumulating small changes over the generations. This happens over the entire geographic range of the species. The fossil record should show long sequences of intermediate forms leading from earlier to later forms. If no intermediate forms are found, gradualists claim it is due to the incompleteness of the fossil record. Either no rocks were deposited during that period, those that were have been eroded away, or conditions were such that no fossils were formed.

Episodic Evolution

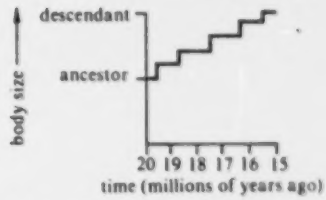
Some scientists suggest that the changes in life forms are *episodic* (changing at irregular intervals). New species appear when small subpopulations of the earlier form become isolated in a small area, usually on the margin of the ancestor's *geographic range* (the region throughout which an organism naturally occurs). Different environmental conditions there cause rapid changes in this isolated population, and, in a few thousand years, a new species may form. In the small area, where the isolated population existed, the record should show sudden replacement of ancestor by descendant, without intermediate forms. Once formed, a new species should not show much change. Most evolution is concentrated in episodes that are brief compared to the time period in which the species existed.

34. Suppose that during the evolution of a new species from its ancestor, the average body size doubled. Samples of the ancestor and descendant are taken from rocks 20 and 15 million years old, respectively. Which of the following graphs of body size versus time best expresses the views of Gradualism?

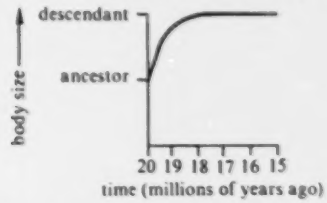
F.



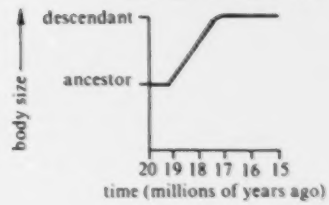
G.



H.



J.



35. If the global climate were to change over the next few thousand years, becoming increasingly colder, which of the following would most likely take place according to the Episodic view?

A. The entire population of most species would change to meet the needs of the new environment.
B. New species better adapted to the environment would develop from small subpopulations, while some of the rest would go extinct.
C. No response to this climatic change would occur.
D. The entire population of most species would go extinct.

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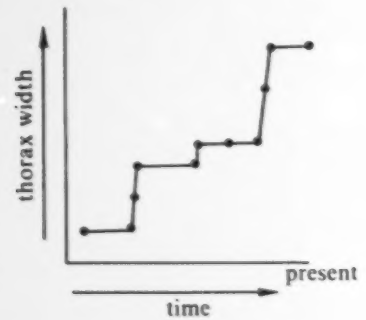
36. The graph below shows the evolution of a species of microscopic organism known as a radiolarian. Width of the *thorax* (the central part of the body) is plotted versus time. Which view of evolution is supported by these results and why?



F. Gradualism, because there is an overall increase in the width of the thorax through time.
G. Gradualism, because the width is constantly changing.
H. Episodic Evolution, because times of little change alternate with times of rapid change.
J. Episodic Evolution, because reversals in the direction of change occur.

37. Which of the following hypotheses about the relationship between generation length and evolutionary rate would be consistent with the views of Gradualism?

A. Organisms with short generation lengths should evolve faster than those with long ones.
B. Organisms with long generation lengths should evolve faster than those with short ones.
C. Generation length should affect rate of evolution only for animals.
D. Generation length should affect rate of evolution only for plants.

38. Mutations, which are changes in the hereditary material of an organism, are responsible for the relatively rapid appearance of new traits. Which of the following statements about mutation would be consistent with the views of Gradualism?

F. Mutations that produce large changes in organisms are usually harmful and do not survive within a population.
G. Mutations that produce large changes in organisms are usually helpful and spread quickly throughout the population.
H. Most organisms have very high rates of mutation.
J. Most mutations create visible changes in an organism that can be seen within a short time period.

39. The clam *Cerastoderma* includes four species that live in the Atlantic Ocean. Dozens of other species of this clam have been found in deposits from the Pontian seas, brackish bodies of water once connected to the Mediterranean Sea. It would NOT be consistent with the Episodic view to hypothesize that there are more species in the Pontian seas because:

A. there are more opportunities for isolation of subpopulations.
B. individual populations there are smaller.
C. they have had a long time for slow changes to accumulate.
D. environmental conditions vary from place to place.

40. Foraminifera (single-celled animals with microscopic shells) are thought to evolve primarily by Gradualism. These organisms live in the open ocean, floating on water currents. Why might these organisms be expected to evolve by Gradualism rather than by Episodic Evolution?

F. Because there are few opportunities for subpopulations to become isolated
G. Because the ocean environment changes rapidly over time
H. Because the ocean environment is constantly changing
J. Because they are single-celled

END OF TEST 4

STOP! DO NOT RETURN TO ANY OTHER TEST.

5

Scoring Your Practice Test

How to Score the Practice Test

The remainder of this booklet provides scoring keys and score conversion tables. Follow the instructions below and on the following pages to score the practice test and review your performance.

Raw Scores

The number of questions you answered correctly on each test and in each subscore area is your raw score. Because there are many forms of the ACT, each containing different questions, some forms will be slightly easier (and some slightly harder) than others. A raw score of 67 on one form of the English Test, for example, may be about as difficult to earn as a raw score of 70 on another form of that test.

To compute your raw scores, check your answers with the scoring keys on pages 57–59. Count the number of correct answers for each of the four tests and seven subscore areas, and enter the number in the blanks provided on those pages. These numbers are your raw scores on the tests and subscore areas.

Scale Scores

To adjust for the small differences that occur among different forms of the ACT, the raw scores for tests and subscore areas are converted into *scale scores*. Scale scores are printed on the reports sent to you and your college and scholarship choices.

When your raw scores are converted into scale scores, it becomes possible to compare your scores with those of examinees who completed different test forms. For example, a scale score of 26 on the English Test has the same meaning regardless of the form of the ACT on which it is based.

To determine the scale scores corresponding to your raw scores on the practice test, use the score conversion tables on pages 60–61. Table 1 on page 60 shows the raw-to-scale score conversions for the total tests, and Table 2 on page 61 shows the raw-to-scale score conversions for the subscore areas. Because each form of the ACT Assessment is unique, each form has somewhat different conversion tables. Consequently, these tables provide only approximations of the raw-to-scale score conversions that would apply if a different form of the ACT Assessment were taken. Therefore, the scale scores obtained from the practice test would not be expected to match precisely the scale scores received from a national administration of the ACT Assessment.

Percent At or Below

Even scale scores don't tell the whole story of your test performance. You may want to know how your scores compare to the scores of other college-bound students who take the ACT.

The norms table (Table 3 on page 62) enables you to compare your scores on the sample test with the scores of recent high school graduates who tested as juniors or seniors. The numbers reported in Table 3 are cumulative percents. A cumulative percent is the percent of students who scored *at* or *below* a given score. For example, a Composite score of 20 has a cumulative percent of 51. This means that 51% of the ACT-tested juniors and seniors had a Composite score of 20 or lower.

Remember that your scores and percent at or below on the sample test are only *estimates* of the scores that you will obtain on an actual form of the ACT. Test scores are only one indicator of your level of academic knowledge and skills. Consider your scores in connection with your grades, your performance in outside activities, and your career interests.

Reviewing Your Performance on the Practice Test

After you have determined your scale scores, consider the following as you evaluate how you did on the practice test.

- Did you run out of time before you completed a test? If so, reread the information in this booklet on pacing yourself. Perhaps you need to adjust the way you used your time in responding to the questions. It is to your advantage to answer every question and pace yourself so that you can do so. Remember there is no penalty for guessing.
- Did you spend too much time trying to understand the directions to the tests? If so, read the directions for each test again thoroughly. The directions in the practice test are exactly like the directions that will appear in your test booklet on the test day. Make sure you understand them now, so you won't have to spend too much time studying them when you take the actual test.
- Review the questions that you missed. Did you select a response that was an incomplete answer or that did not directly respond to the question being asked? Try to figure out what you overlooked in answering the questions.
- Did a particular type of question confuse you? Did the questions you missed come from a particular subscore area? In reviewing your responses to the practice test, check to see whether a particular type of question or a particular subscore area was more difficult for you or took more of your time.

Scoring Keys for the ACT Practice Test

Use the scoring key for each test to score your answer document for the practice test. Mark a "1" in the blank for each question you answered correctly. Add up the numbers in each subscore area and enter the total number correct for each subscore area in the blanks provided. Also enter the total number correct for each test in the blanks provided. The total number correct for each test is the sum of the number correct in each subscore area.

Test 1: English—Scoring Key

	Key	Subscore Area* UM	RH		Key	Subscore Area* UM	RH		Key	Subscore Area* UM	RH
1.	B	_____		26.	J		_____	51.	C	_____	
2.	F		_____	27.	A	_____		52.	F		_____
3.	A		_____	28.	J	_____		53.	D		_____
4.	H	_____		29.	A		_____	54.	H		_____
5.	A	_____		30.	G		_____	55.	C	_____	
6.	H	_____		31.	B	_____		56.	H	_____	
7.	D	_____		32.	J	_____		57.	D		_____
8.	H	_____		33.	D		_____	58.	J		_____
9.	B		_____	34.	H	_____		59.	C		_____
10.	J	_____		35.	B	_____		60.	G		_____
11.	B		_____	36.	H	_____		61.	A	_____	
12.	G		_____	37.	A	_____		62.	H		_____
13.	A	_____		38.	J		_____	63.	D	_____	
14.	F		_____	39.	D		_____	64.	G	_____	
15.	C		_____	40.	J	_____		65.	A	_____	
16.	G	_____		41.	C	_____		66.	H	_____	
17.	D	_____		42.	F		_____	67.	D	_____	
18.	H		_____	43.	B		_____	68.	H	_____	
19.	C	_____		44.	G		_____	69.	C		_____
20.	F		_____	45.	B		_____	70.	H	_____	
21.	A		_____	46.	G	_____		71.	A	_____	
22.	H		_____	47.	D	_____		72.	G	_____	
23.	B		_____	48.	G	_____		73.	B		_____
24.	J	_____		49.	A		_____	74.	J		_____
25.	C	_____		50.	G	_____		75.	A		_____

Number Correct (Raw Score) for:	
Usage/Mechanics (UM) Subscore Area	_____ (40)
Rhetorical Skills (RH) Subscore Area	_____ (35)
Total Number Correct for English Test (UM + RH)	_____ (75)

* UM = Usage/Mechanics
RH = Rhetorical Skills

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Test 2: Mathematics—Scoring Key

	Key	Subscore Area* EA	AG	GT
1.	A	———		
2.	F			———
3.	C	———		
4.	J		———	
5.	B			———
6.	H	———		
7.	D	———		
8.	J	———		
9.	C			———
10.	K	———		
11.	C	———		
12.	H	———		
13.	C	———		
14.	K	———		
15.	B			———
16.	H	———		
17.	A			———
18.	F			———
19.	B	———		
20.	F	———		
21.	D	———		
22.	G		———	
23.	B			———
24.	G		———	
25.	B		———	
26.	J		———	
27.	B	———		
28.	H			———
29.	A			———
30.	F			———

	Key	Subscore Area* EA	AG	GT
31.	C		———	
32.	K			———
33.	D			———
34.	G		———	
35.	E		———	
36.	K	———		
37.	C			———
38.	G		———	
39.	C			———
40.	K		———	
41.	A			———
42.	K	———		
43.	A	———		
44.	G	———		
45.	B	———		
46.	K	———		
47.	D	———		
48.	K			———
49.	B		———	
50.	F		———	
51.	B	———		
52.	H			———
53.	D		———	
54.	F		———	
55.	D		———	
56.	K		———	
57.	D			———
58.	J		———	
59.	E		———	
60.	J	———		

Number Correct (Raw Score) for:	
Pre-Alg./Elem. Alg. (EA) Subscore Area	——— (24)
Inter. Alg./Coord. Geo. (AG) Subscore Area	——— (18)
Plane Geo./Trig. (GT) Subscore Area	——— (18)
Total Number Correct for Math Test (EA + AG + GT)	——— (60)

* EA = Pre-Algebra/Elementary Algebra
AG = Intermediate Algebra/Coordinate Geometry
GT = Plane Geometry/Trigonometry

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Test 3: Reading—Scoring Key

	Key	Subscore Area* SS	AL		Key	Subscore Area* SS	AL		Key	Subscore Area* SS	AL
1.	B		_____	15.	B	_____		29.	D		_____
2.	J		_____	16.	F	_____		30.	F		_____
3.	B		_____	17.	C	_____		31.	B	_____	
4.	J		_____	18.	G	_____		32.	H	_____	
5.	C		_____	19.	C	_____		33.	C	_____	
6.	F		_____	20.	G	_____		34.	F	_____	
7.	B		_____	21.	B		_____	35.	B	_____	
8.	J		_____	22.	J		_____	36.	F	_____	
9.	A		_____	23.	B		_____	37.	C	_____	
10.	J		_____	24.	F		_____	38.	G	_____	
11.	D	_____		25.	C		_____	39.	D	_____	
12.	F	_____		26.	F		_____	40.	J	_____	
13.	C	_____		27.	D		_____				
14.	J	_____		28.	G		_____				

Number Correct (Raw Score) for:

Social Studies/Sciences (SS) Subscore Area _____ (20)

Arts/Literature (AL) Subscore Area _____ (20)

Total Number Correct for Reading Test (SS + AL) _____ (40)

* SS = Social Studies/Sciences
AL = Arts/Literature

Test 4: Science Reasoning—Scoring Key

	Key			Key			Key	
1.	D	_____	15.	B	_____	29.	B	_____
2.	G	_____	16.	H	_____	30.	J	_____
3.	C	_____	17.	A	_____	31.	B	_____
4.	H	_____	18.	J	_____	32.	G	_____
5.	D	_____	19.	C	_____	33.	A	_____
6.	G	_____	20.	F	_____	34.	F	_____
7.	C	_____	21.	D	_____	35.	B	_____
8.	G	_____	22.	J	_____	36.	H	_____
9.	B	_____	23.	C	_____	37.	A	_____
10.	F	_____	24.	F	_____	38.	F	_____
11.	B	_____	25.	D	_____	39.	C	_____
12.	G	_____	26.	H	_____	40.	F	_____
13.	A	_____	27.	D	_____			
14.	J	_____	28.	F	_____			

Number Correct (Raw Score) for:

Total Number Correct for Science Reasoning Test _____ (40)

TABLE 1

Procedures Used to Obtain Scale Scores From Raw Scores for the ACT Practice Test

On each of the four tests on which you marked any responses, the total number of correct responses yields a raw score. Use the table below to convert your raw scores to scale scores. For each test, locate and circle your raw score or the range of raw scores that includes it in the table below. Then, read across to either outside column of the table and circle the scale score that corresponds to that raw score. As you determine your scale scores, enter them in the blanks provided on the right. The highest possible scale score for each test is 36. The lowest possible scale score for any test on which you marked any response is 1.

Next, compute the Composite score by averaging the four scale scores. To do this, add your four scale scores and divide the sum by 4. If the resulting number ends in a fraction, round it off to the nearest whole number. (Round down any fraction less than one-half; round up any fraction that is one-half or more.) Enter this number in the blank. This is your Composite score. The highest possible Composite score is 36. The lowest possible Composite score is 1.

ACT Test	Your Scale Score
English	_____
Mathematics	_____
Reading	_____
Science Reasoning	_____
Sum of scores	_____
Composite score (sum ÷ 4)	_____

NOTE: If you left a test completely blank and marked no items, do not list a scale score for that test. If any test was completely blank, do not calculate a Composite score.

Scale Score	Raw Scores				Scale Score
	Test 1 English	**Test 2** Mathematics	**Test 3** Reading	**Test 4** Science Reasoning	
36	75	60	39–40	40	**36**
35	—	—	38	—	**35**
34	74	59	—	39	**34**
33	73	58	37	—	**33**
32	72	57	—	38	**32**
31	71	55–56	36	37	**31**
30	69–70	53–54	35	36	**30**
29	68	50–52	34	35	**29**
28	66–67	48–49	—	34	**28**
27	64–65	45–47	32–33	32–33	**27**
26	61–63	43–44	31	31	**26**
25	59–60	40–42	30	29–30	**25**
24	56–58	38–39	29	27–28	**24**
23	54–55	35–37	28	26	**23**
22	52–53	33–34	27	24–25	**22**
21	49–51	31–32	25–26	22–23	**21**
20	46–48	28–30	24	20–21	**20**
19	44–45	26–27	23	18–19	**19**
18	41–43	23–25	21–22	16–17	**18**
17	39–40	20–22	20	15	**17**
16	36–38	17–19	19	13–14	**16**
15	33–35	15–16	17–18	12	**15**
14	30–32	13–14	16	10–11	**14**
13	28–29	11–12	14–15	09	**13**
12	25–27	09–10	13	08	**12**
11	23–24	07–08	11–12	06–07	**11**
10	20–22	06	09–10	05	**10**
9	17–19	05	08	04	**9**
8	14–16	04	07	—	**8**
7	12–13	—	06	03	**7**
6	09–11	03	05	02	**6**
5	07–08	02	04	—	**5**
4	05–06	—	03	01	**4**
3	04	01	02	—	**3**
2	02–03	—	01	—	**2**
1	00–01	00	00	00	**1**

TABLE 2

Procedures Used to Obtain Scale Subscores From Raw Scores for the ACT Practice Test

For each of the seven subscore areas, the total number of correct responses yields a raw score. Use the table below to convert your raw score to scale subscores. For each of the seven subscore areas, locate and circle either the raw score or the range of raw scores that includes it in the table below. Then, read across to either outside column of the table and circle the scale subscore that corresponds to that raw score. As you determine your scale subscores, enter them in the blanks provided on the right. The highest possible scale subscore is 18. The lowest possible scale subscore is 1.

If you left a test completely blank and marked no items, do not list any scale subscores for that test.

ACT Test	Your Scale Subscore
English	
Usage/Mechanics (UM)	_____
Rhetorical Skills (RH)	_____
Mathematics	
Pre-Algebra/Elem. Algebra (EA)	_____
Inter. Algebra/Coord. Geometry (AG)	_____
Plane Geometry/Trigonometry (GT)	_____
Reading	
Social Studies/Sciences (SS)	_____
Arts/Literature (AL)	_____

	Raw Scores							
	Test 1 English		Test 2 Mathematics			Test 3 Reading		
Scale Subscore	Usage/ Mechanics	Rhetorical Skills	Pre-Algebra/ Elem. Algebra	Inter. Algebra/ Coord. Geometry	Plane Geometry/ Trigonometry	Social Studies/ Sciences	Arts/ Literature	Scale Subscore
18	39–40	35	24	18	18	20	20	18
17	38	—	22–23	17	—	19	19	17
16	36–37	33–34	21	16	17	18	18	16
15	34–35	32	20	14–15	16	17	17	15
14	32–33	30–31	18–19	13	14–15	16	—	14
13	30–31	28–29	17	11–12	13	15	16	13
12	28–29	26–27	15–16	10	11–12	13–14	15	12
11	26–27	24–25	14	08–09	09–10	12	14	11
10	24–25	22–23	12–13	07	08	11	13	10
9	22–23	19–21	10–11	05–06	06–07	09–10	12	9
8	19–21	16–18	09	04	05	08	11	8
7	17–18	14–15	07–08	03	04	07	09–10	7
6	15–16	12–13	06	—	03	06	08	6
5	12–14	09–11	04–05	02	—	05	07	5
4	09–11	07–08	03	—	02	04	06	4
3	07–08	05–06	02	01	—	03	05	3
2	05–06	03–04	01	—	01	02	03–04	2
1	00–04	00–02	00	00	00	00–01	00–02	1

TABLE 3
Norms Table for the ACT Practice Test

Use the norms table below to determine your estimated percent at or below for each of your scale scores.

In the far left column, circle your scale score for the English Test (from page 60). Then read across to the percent at or below column for that test; circle or put a check mark beside the corresponding percent at or below. Use the same procedure for each test (from page 60) and subscore area (from page 61). You may find it easier to use the right column of scale scores for your Science Reasoning Test and Composite scores.

As you mark your percents at or below, enter them in the blanks provided at the right.

You may also find it helpful to compare your performance with the national mean (average) score for each of the four tests, subscore areas, and the Composite as shown at the bottom of the norms table.

ACT Test	Your Estimated Percent At or Below on Practice Test	
English		_____
Usage/Mechanics	_____	
Rhetorical Skills	_____	
Mathematics		_____
Pre-Algebra/Elem. Alg.	_____	
Alg./Coord. Geometry	_____	
Plane Geometry/Trig.	_____	
Reading		_____
Soc. Studies/Sciences	_____	
Arts/Literature	_____	
Science Reasoning		_____
Composite		_____

National Distributions of "Percent At or Below" for ACT Test Scores
1995 HS Graduates Tested on National Test Dates

Score	ENGLISH	Usage/Mechanics	Rhetorical Skills	MATHEMATICS	Pre-Algebra/Elem. Alg.	Alg./Coord. Geometry	Plane Geometry/Trig.	READING	Soc. Studies/Sciences	Arts/Literature	SCIENCE REASONING	COMPOSITE	Score
36	99			99				99			99	99	36
35	99			99				99			99	99	35
34	99			99				98			99	99	34
33	99			99				96			99	99	33
32	99			99				95			99	99	32
31	99			99				94			98	99	31
30	98			97				92			97	98	30
29	96			96				90			96	96	29
28	93			93				88			94	94	28
27	90			91				85			91	91	27
26	87			88				80			88	87	26
25	82			84				76			84	83	25
24	76			80				72			80	78	24
23	71			75				66			73	72	23
22	65			69				61			65	66	22
21	60			64				54			58	58	21
20	53			58				47			49	51	20
19	47			51				41			40	42	19
18	40	99	99	43	99	99	99	33	99	99	31	34	18
17	33	99	99	34	98	99	98	28	98	96	24	26	17
16	27	97	98	25	95	98	98	23	95	91	16	19	16
15	21	92	96	17	92	96	97	18	91	85	10	13	15
14	15	87	92	10	86	92	93	14	86	78	06	08	14
13	11	81	84	05	81	87	85	10	80	70	03	04	13
12	07	73	76	02	73	81	78	07	73	61	01	02	12
11	04	66	64	01	64	73	67	04	64	52	01	01	11
10	02	56	53	01	54	60	53	02	53	43	01	01	10
09	01	46	41	01	44	45	39	01	41	35	01	01	09
08	01	36	28	01	31	27	27	01	27	28	01	01	08
07	01	25	17	01	20	17	14	01	17	21	01	01	07
06	01	15	09	01	12	11	07	01	10	14	01	01	06
05	01	08	04	01	05	06	06	01	05	08	01	01	05
04	01	03	01	01	02	04	03	01	03	05	01	01	04
03	01	01	01	01	01	02	02	01	02	02	01	01	03
02	01	01	01	01	01	01	01	01	01	01	01	01	02
01	01	01	01	01	01	01	01	01	01	01	01	01	01
MEAN	20.2	10.1	10.4	20.2	10.4	10.0	10.3	21.3	10.5	11.1	21.0	20.8	
S.D.	5.3	3.4	2.9	4.9	3.3	3.0	3.0	6.0	3.3	3.9	4.6	4.6	

Note: These norms are the source of national and state norms printed on ACT Assessment score reports during the 1995-96 testing year. Sample size: 945,369.

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To Register for the ACT

You can get an ACT Assessment student registration packet from your high school counselor. If your high school cannot help you, write or call:

ACT Registration Department
P.O. Box 414
Iowa City, IA 52243-0414
319/337-1270

A copy of the booklet *Registering for the ACT Assessment* is included in the registration packet. That booklet describes the steps you must take to register for the ACT.

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